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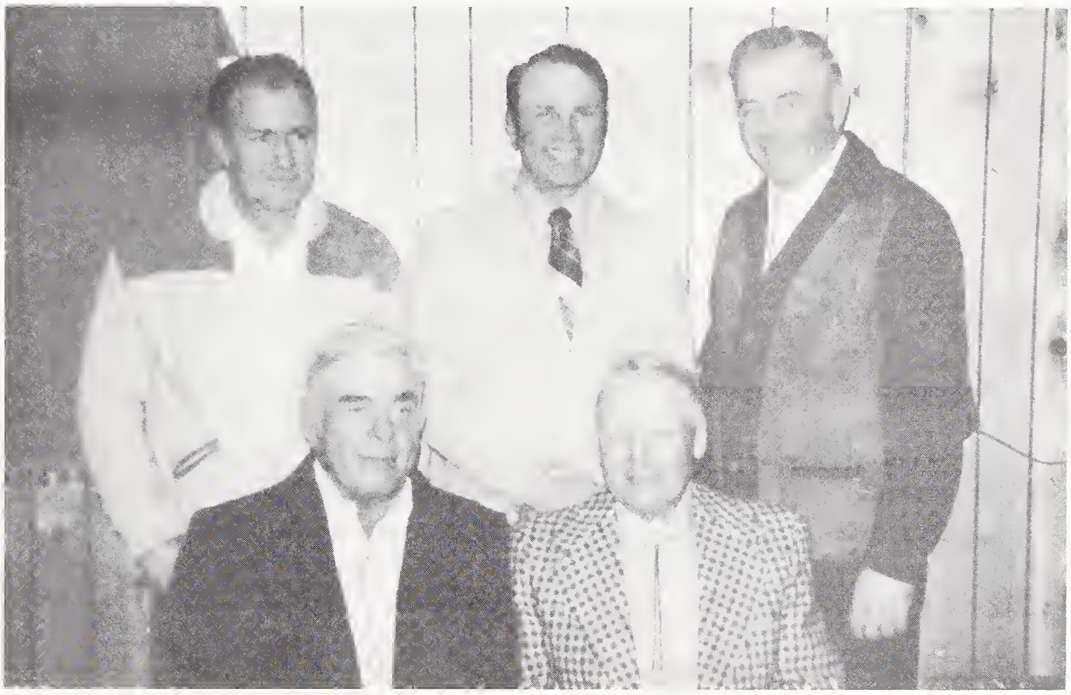
Conservation Districts

People Working Together



BACK ROW: Robert Simpson, Roland Mosher, Wesley Johnson
FRONT ROW: Frank Schatz, Frank Thompson

Rangeland
Resource
Committee
developing
Sediment
Control
Ordinance.

FORWARD

This plan has been developed by the Lewis and Clark County Conservation District with assistance from the Soil Conservation Service and other cooperating groups and individuals. It will provide an inventory of the resources, establish goals and objectives, determine policies and make environmental assessments. This information is needed and desirable to the resource manager to assist in making sound land use decisions for the enhancement of the resource and the environment.

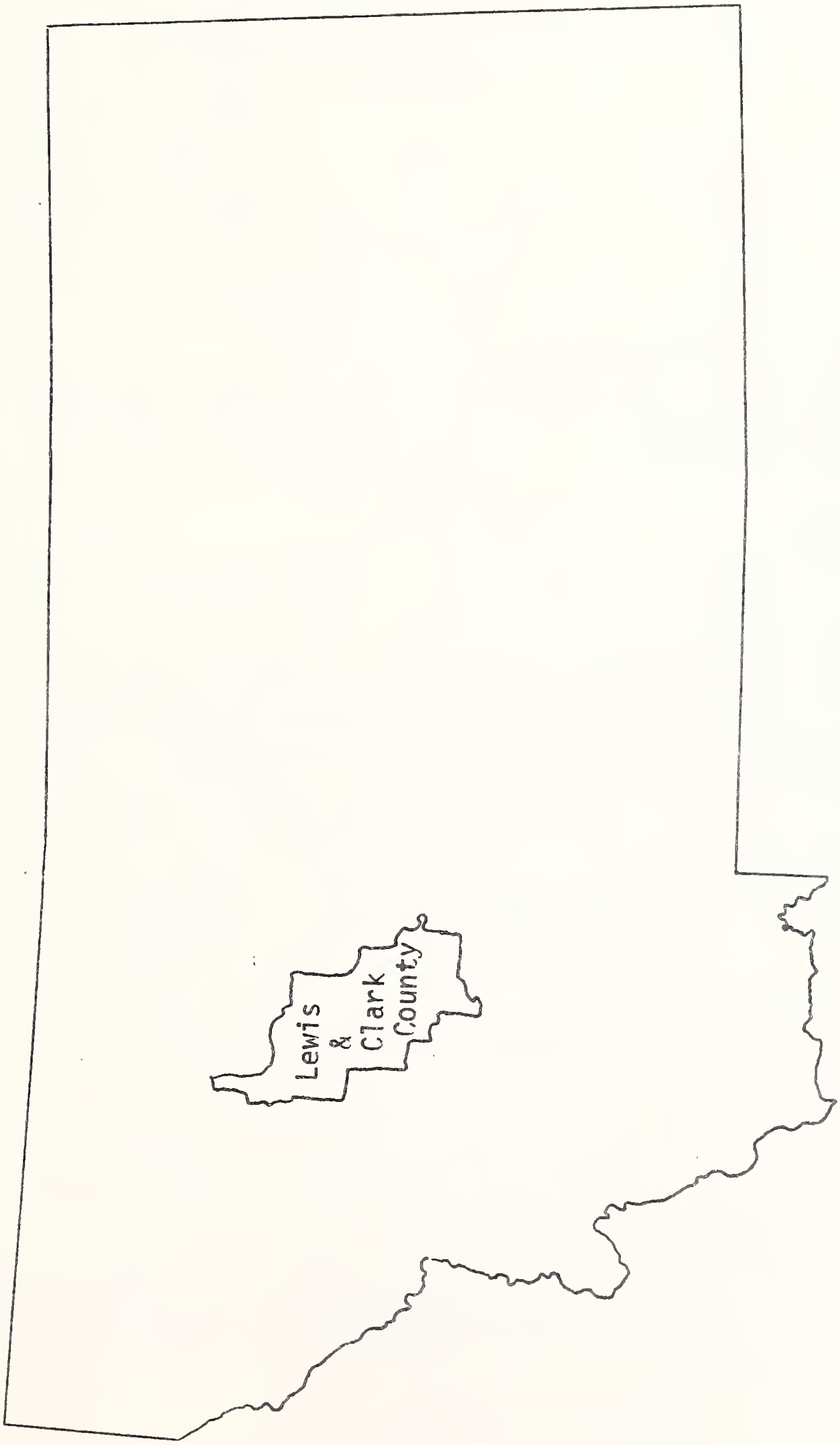
This plan is designed to be a dynamic tool in determining needs, establishing priorities and allocating resources toward the solution to the primary resource problems of the Conservation District.

This plan will be in a constant state of review to meet changing needs and conditions of the District in line with the needs and priorities of the resources. It will become a highly significant tool for the Conservation District, planning groups, cooperating agencies, and others in forming a reliable framework for future planning.

It will also provide the Conservation District with a pattern to follow as progress from year to year is analyzed and planned to meet the needs of the resource and will give direction to supervisors in carrying out their responsibilities.

A special section on water quality planning is included in the plan to emphasize the importance of that task in light of the national mandate for a quality environment. The Lewis and Clark County Conservation District is fully committed to doing its part in meeting that goal. The passage of a Sediment Control Ordinance under the authority of the Conservation District Law, accepting the challenge of being the management agency for the implementation of the 208 planning process, and allocation of financial resources toward the employment of personnel to assist in these implementation processes show the commitment of the District Board of Supervisors to improving and enhancing the environment in Lewis and Clark County.

All public agencies, including local, state, and federal governments, who have responsibility for conservation and development of land, water, wildlife, forests, and open space have had an opportunity to assist in the development of this plan. The future success of managing activities in harmony with this plan depends on the cooperation of agencies, local organizations, news media, and local educators. Their assistance in implementing, updating, and maintaining the plan will insure its effectiveness as we move toward a brighter future.


Lewis
&
Clark
County

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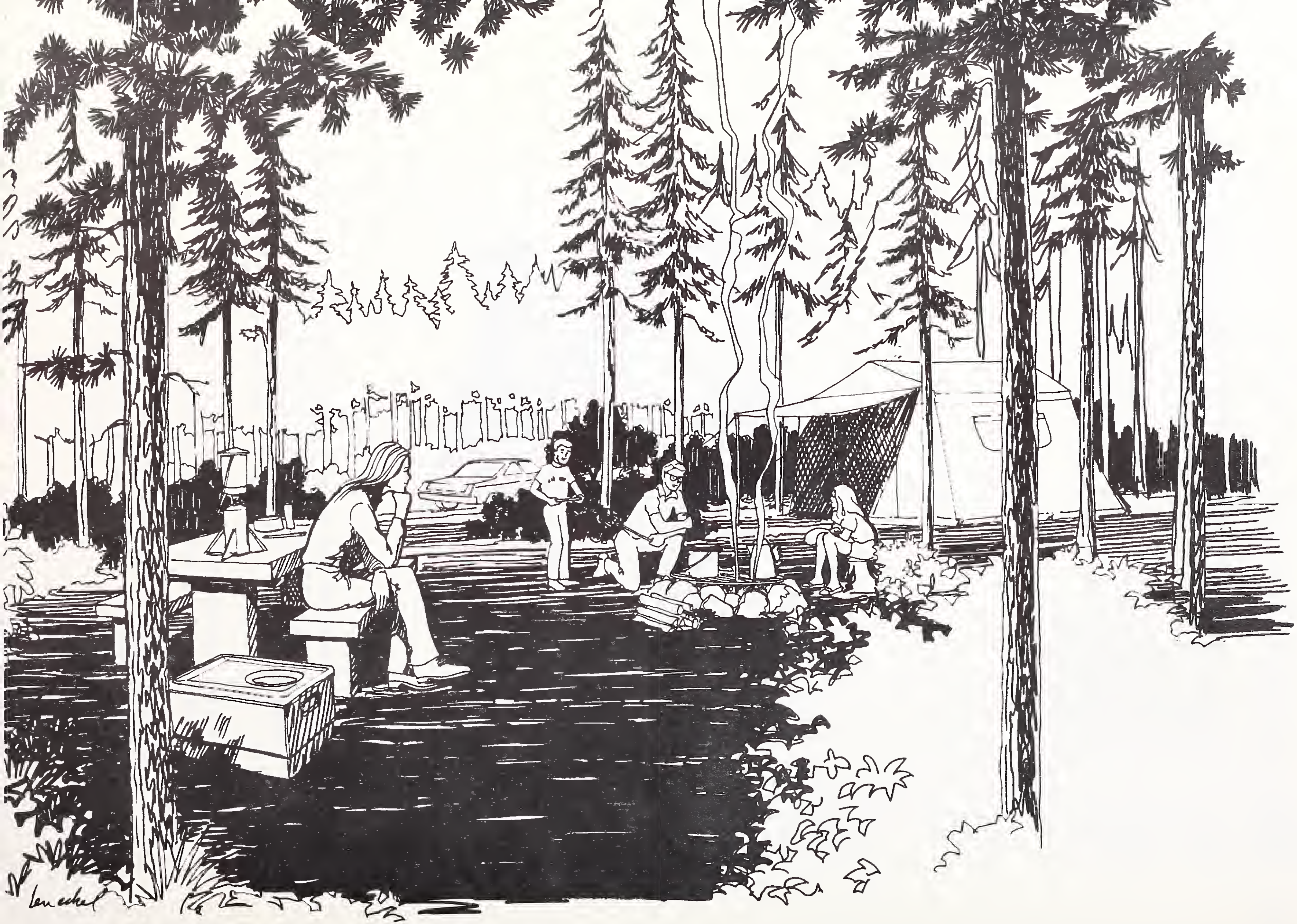


Man must work in harmony with nature to conserve our natural resources for our own use and enjoyment as well as for future generations.

I INTRODUCTION

DISTRICT ORGANIZATION

The Lewis and Clark County Conservation District was organized in December 1948. It included all of Lewis and Clark County except a portion in the northeast corner which was a part of the Cascade County Conservation District, and included the portion of Jefferson County lying north of the Boulder hill.

Charter members of the Board of Supervisors were Myrlin Donaldson, George Diehl, Gilman Mirehouse, Robert Mosher, and Adolph Burgraff. Brick Vaughn served as the first District Secretary, and Rex Campbell and Homer Turner were the first technicians with the Soil Conservation Service.

In 1961, that portion of Lewis and Clark County incorporated in the Cascade County Conservation District was made a part of the Lewis and Clark County Conservation District. In June of 1966, the portion of this District in Jefferson County was made a part of the Jefferson Valley Conservation District. This established the official boundary of the District along the county lines. At the time the District was formed, the platted city boundaries of Helena and East Helena were omitted from the District. Areas annexed to the city boundaries of Helena, however, since 1948 are included as part of the District.

The Conservation District Supervisors are concerned people who are willing to give of their time and talent in an effort to make this District, State, and Nation a better place in which to live, work, and play. Serving in this capacity over the years have been Paul Kleffner, Marvin Dallas, Kenneth Gourley, William J. Barrett, Harry Nichols, Don Hilger, and Myrlin Donaldson who retired in 1978 after thirty years service on the Board.

Supervisors currently serving on the Board are Frank Thompson, Frank Schatz, Roland Mosher, Robert Simpson, and Wesley Johnson.

Conservation Districts are democracy at work. They are organized and operate under the State Conservation Act originally passed in 1937 and revised in 1971. They are organized by a vote of the people within the District. They are legal subdivisions of the State, and public bodies corporate and political, with certificate of organization issued by the Secretary of State of Montana.

A Conservation District is managed by a Board of Supervisors of which five are elected.

Districts are assisted by many agencies, organizations, groups and individuals. They provide a means for all interested people in a community, area or region to work together for natural resource conservation and development. Participation is strictly voluntary.

Conservation Districts are organized by local residents who petition, hold referendum and vote to form a District. A board consists of a minimum of five elected members. Incorporated towns or cities may vote to join the Conservation District by referendum. A maximum of two urban members can then be appointed by the mayors of included municipalities to the Conservation District Board of Supervisors. Associate members can be appointed to assist the Conservation District in a variety of ways. One member of the Conservation District Board of Supervisors is a member of the county planning board by mandate of state law.

The Conservation District with memorandums of understanding with the United States Department of Agricultural and others obtain technical assistance to carry out resource management programs in the District. The Soil Conservation Service being the primary source provides people to assist the landuser with conservation planning and application of needed land treatments. With assistance from soil surveys, engineering surveys, biologists, agronomists, geologists, woodland specialists, and others, the conservationist brings to the landuser a total field of expertise to solve a local problem. The Conservation District is involved in special project areas within a Conservation District which may include watershed projects, resource conservation and development projects, saline seep studies, river basin studies, flood hazard analyses, and others that are needed for a particular situation.

The Conservation District has the responsibility of conducting a comprehensive overall program for the county. Included in this responsibility is the assessment of needs, setting of priorities for solutions to primary resource problems, and developing a policy of action. The Conservation District has historically operated as a voluntary participation-type organization. Individuals, groups and units of government by request and signatory to a cooperative agreement are considered for technical service on a priority basis. The Conservation District will continue to seek cooperation on a voluntary basis; however, with the passage of a Sediment Control Ordinance under authority of the Conservation District Law, the passage of a Natural Streambed and Land Preservation Act, and by virtue of certain powers vested in the District law, the District does have the authority to institute solutions to critical land use problems. Land uses include mining companies, railroads, highway departments, school districts, state parks, wildlife refuges, and many others.

Other agencies of State and Federal Government who work closely with the Conservation District include the Montana Fish and Game Department, Montana Department of Natural Resources and Conservation, Montana Department of Land Investments, Montana Department of Forestry, U.S. Forest Service, Agricultural Stabilization and Conservation Service, Farmers Home Administration, Cooperative Extension Service and Bureau of Indian Affairs.

The cost-sharing concept, whereby the Federal Government pays a portion of the conservation job, was developed many years ago by Congress during the dust bowl days of the 30's because it was felt that the public welfare was best served if these conservation measures were speeded up and participated in by all citizens. All persons, rural and urban, will benefit from any conservation practices applied to our basic resources of land and water.

The Agricultural Conservation Program (ACP) of the U.S.D.A. is available to qualified land users for the application of eligible conservation practices. Conservation District Supervisors' input into the program stresses the need for directing these efforts toward solutions to critical resource problems.

The public land mangement agencies, such as the Bureau of Land Management, State Department of Lands, U.S. Forest Service, and others, have the responsibility for the planning and management of their lands under laws and policies set forth by Congress and the State Legislature. Their activities include total resource management through the multiple-use concept to include benefits for grazing of domestic animals, wildlife, timber, recreation, watershed, aesthetic values and many other needs.

* * * * * * * *

AGRICULTURAL DEVELOPMENT

Historical Background

The first authentic information in regard to this part of the State is found in the memoirs of the Lewis and Clark Expedition to the Northwest in 1805 and 1806 and from the diaries of members of this expedition. Some of the early trappers followed the route of this expedition through the mountains during the 1830's and 1840's and additional information regarding the area is obtained from their accounts. Various expeditions were organized during the 1850's to investigate the natural resources, to make treaties with the Indians, and to determine the feasibility of building a railway through the Northwest Territory. Mullan and others of the Haydens Expedition investigated the location and elevation of the mountain passes and the amount of snow on the Continental Divide during this period.

This area was largely hunting grounds of the Blackfoot Indian Tribe, who were placed on reservations during the 1880's. Trapping and trading with the Indians were the chief industries until the time of the discovery of placer gold in the Elkhorn and Big Belt Mountains in 1864 and 1865. Gold-bearing quartz veins also were discovered at this time, but they were not extensively worked until transportation facilities were developed.

Helena owes its existence to placer gold discoveries made in Last Chance Gulch, which is now Helena's main business district. Gold was first discovered there in July, 1864, by a party of prospectors consisting of John Cowan, Robert Stanley, and Gabe Johnson. These men found some good colors panning the sands and gravels of the gulch, but they were not quite satisfied with their discovery and left to try their luck further north. Finding conditions unfavorable in the north, they returned to the gulch late in the fall, agreeing among themselves that it was their "last chance" for that season; hence the name "Last Chance" which they gave to the gulch. After more extensive exploration and prospecting, the men found that the gulch was fabulously rich in placer gold. News of the gold strike spread rapidly and, in a few weeks, a tent and log cabin city had been erected around the diggings.

As a result of action by the Territorial Legislature and an election, Helena became the capitol of the territory in 1875. Virginia City made a strenuous campaign to retain the capitol, but Helena was the largest town in the Territory at that time and the general election was heavily in favor of Helena. When Montana became a State on September 8, 1889, Helena became the temporary state capitol until an election could be held in 1892. Almost every town in the state entered the contest, but Helena emerged the victor.

Helena's growth during the 1870's was accelerated by other rich mining discoveries nearby. In those years, gold and silver mines were opened at Rimini to the southwest, at Marysville to the west, and the Gould-Stemple District, forty miles northwest. Across the Missouri River such placer gulches as Confederate, Whites, Avalanche, Hellgate, Magpie, Cove, Oregon, and York yielded gold estimated at $30 million. Prospectors and capitalists of Helena discovered and developed rich silver and lead deposits at Wickes, Corbin, and Elkhorn in Jefferson County. Also sponsored by Helena's capitalists was the smelter at Wickes, where the mines of that section yielded $50 million before 1892. When the East Helena smelter was built in 1888, the plant at Wickes lost favor and was purchased in 1892 by the American Smelting and Refining Company, who dismantled and moved it to East Helena. A great mining center, Helena in the 1890's was said to be the richest city per capita in the United States, numbering fifty millionaires among its residents.

With the slump in the price of silver in 1893, it looked as though Helena would be nothing more than the capitol of Montana. Many people who had built elaborate homes moved away and pessimistically predicted that the town was doomed. The prediction was that, within one year's time, you could buy the best building in town for one hundred dollars. Many of Helena's millionaires who had invested their money in the city became disgusted and left. What these people did not realize was that stock raising, sheep raising, wheat growing, and various industrial enterprises would supplement the loss of the mining boom.

Change in Agriculture

The history of agriculture in Lewis & Clark County began simultaneously with the first discovery of gold. Many of the immigrants who came to Montana in the early 1860's found that there were no mining claims to be had and turned to farming and stock raising as second choice.

The first livestock were driven into the Helena Valley and the Sun River Valley in the early 1870's from Fort Shaw. Sheep were trailed in at about the same time from the Oregon territory. The land taken up by the early stockmen was chiefly bottomland suitable for pasture and for the production of wild hay, winter grazing land, and land on which water holes were located. Mining and stock raising were the chief industries for many years after the railway entered the area.

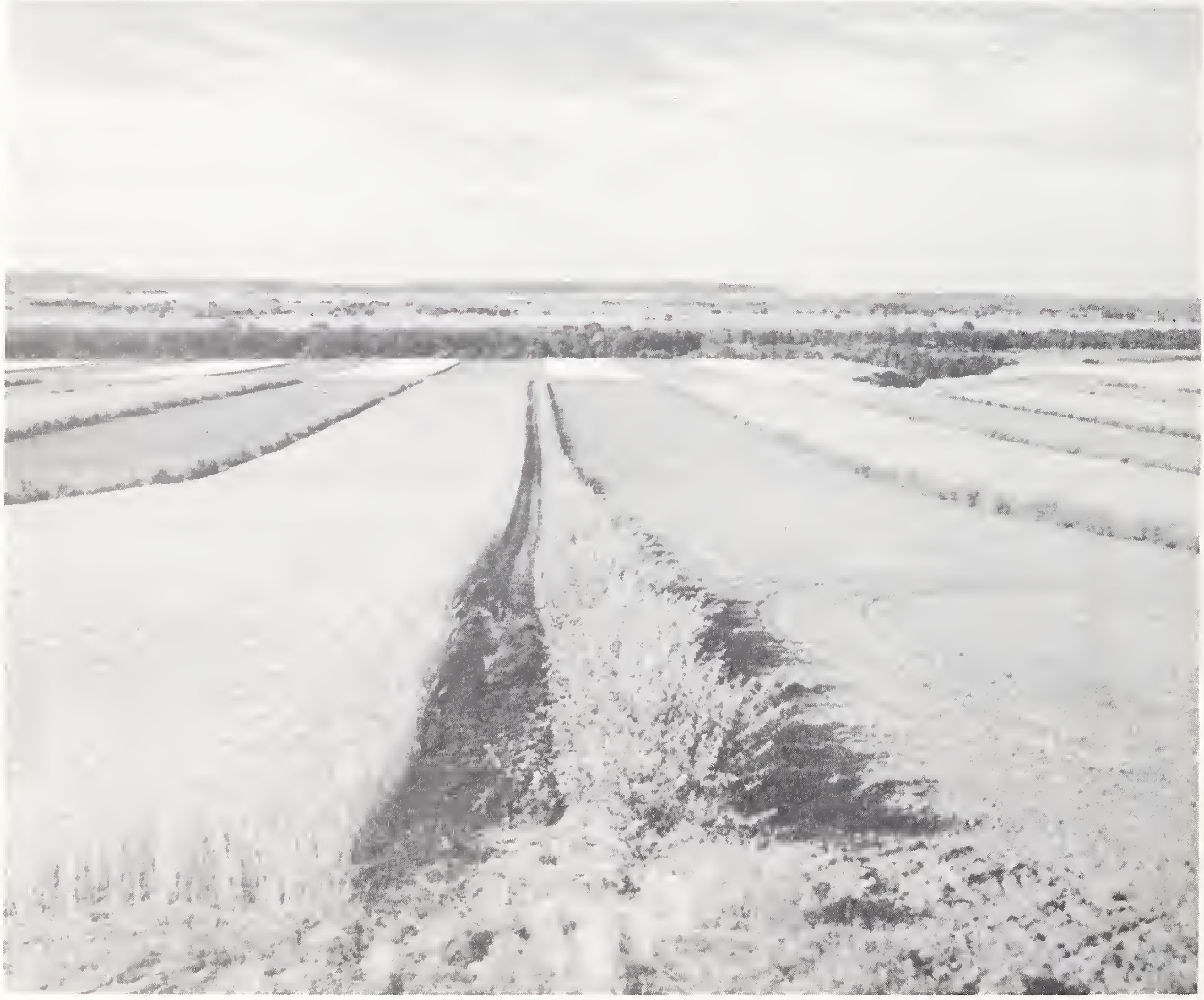
The public domain was largely under the control of stockmen and miners until the time of the creation of the national forests. In approximately 1906, various State agencies undertook the development of the agricultural resources of Montana and, with favorable climatic conditions for crop production, they were instrumental in the settlement of a large portion of public domain as suitable for farming. The land filed upon under the Homestead and Desert Acts in Lewis & Clark County was in the foothills, intermountain basins, and on the plains. Much of this land was placed under cultivation between 1908 and 1915. The increase in rural and urban population during the homesteading period was largely the result of migration from the agricultural districts and industrial centers of the central and northcentral states.

With the coming of the homesteaders came the plow and the desire to farm the land. Most of the suitable areas for farming were plowed, tilled, and seeded to grain. Many of these areas were unsuited to cultivation and soon were abandoned or seeded back to grass.

The need for irrigation farming was becoming more and more evident as farmers and ranchers diverted water into usually low-producing areas to produce abundant crops which assured them of success. From this movement hundreds of irrigation systems evolved. Irrigation districts were formed to provide groups of people with irrigation water. Soon the Bureau of Reclamation provided planning for the implementation of the Helena Valley Irrigation District.

Over the years, irrigation farmers have raised potatoes, sugar beets, vegetable gardens, and many other crops. Today the area is basically involved in raising small grain and a high quality alfalfa hay. A new kind of irrigation is also being used. Lands that were flood irrigated are now using a variety of sprinkler systems that are making better use of the water.

More products are being produced to feed a hungry world by modern agriculture with constant improvements in methods, but with the realization that the land must be protected from deterioration. Everyone must realize that the land is the foundation of our very existence and has shaped and adapted us to our environment whereby we can lead productive, healthy, and happy lives.



Narrow strips and rows of trees act as a windbreak to prevent wind erosion.

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II DISTRICT PROGRAM

General

The program of the Lewis and Clark County Conservation District is a local plan of action to assist landusers in planning and applying necessary conservation treatment measures to the land in accordance with its needs and capabilities. The Conservation District program will serve as a guide in accomplishing the following:

Resource conservation and development planning;

Comprehensive land use planning:

Environmental enhancement planning;

Pollution abatement planning; and

Water quality planning.

The plan will involve the following areas:

Obtaining and reacting to public involvement;

Establishment of policy;

Inventorying and analyzing the natural resource;

An inventory and evaluation of water quality problems;

Setting goals and objectives;

Establishment of priorities for treatment of prime resource problems;

Recognition of problems and opportunities for wise use and development;

Coordination of land users and other resource groups and agencies;

Secure technical assistance; and

Resolution of adoption.

Purpose

1. Soil Conservation

Conservation is the wise use of the natural resources to serve the greatest number of people over the longest period of time, while still maintaining the quality of the environment.

Modern soil and water conservation concepts include the multiple use for the maximum benefit of man both now and in the future. Conservation and wise use of our natural resources refers to all natural resources associated with soil and water. This includes vegetation, forests, wildlife, and recreation assets as well.

Whether you are rural or urban, you have a stewardship responsibility in the natural resources and their wise use and improvement now and in the future. The wealth of a county, state or nation ultimately depends on the productivity of the soil, water and other allied resources.

Increased pressure and demands for land as a place to live, work, and play are expanding the role of the District in society. The traditional role of the District was primarily concerned with agriculture and forestry. However, active involvement is now required in stream management and pollution control as well. Many people using the land are not related to agricultural activities and they are unfamiliar with the needs for care and treatment of the resource.

Coupled with this public pressure for wider diversity of uses is increasing demand for a quality environment. Consequently, additional purposes of this program are to plan measures for pollution control and abatement to include ecological consideration in determining the highest and best use of land within its capabilities and to choose intelligently among the many competitive uses. The latter purpose involves consideration of the multiple use concept as opposed to single use, plus an evaluation of trends toward public ownership and the various methods of regulation that might be used to effect proper land use. Soil conservation also gives emphasis to the enhancement of water quality, natural beauty, and wildlife, preservation of scenic qualities, historic sites, and unique natural areas, and improvement of environment, health, and job opportunities.

2. Administrative Guide (Outline of plan for land use and natural resource development)

This plan will serve as an administrative guide for supervisors and is an outline of the means whereby the Board of Supervisors hopes to coordinate efforts for the orderly management of the natural resources on all lands in the District. (Reference is made to the "Basic Guide for Montana Conservation District Supervisors", designed to assist supervisors to assume their responsibilities for total resource conservation and development.)

3. Reference

This plan will serve as a reference for technicians, county commissioners, land use planners, community planners, researchers, educators, and others working with the districts, particularly those agencies that require a district program to follow as provided in Memoranda of Understanding or other appropriate agreements.

4. Annual Work Plan

This plan will serve as a basis for developing the Annual Plan of District Operations.

5. Information

This plan will serve as the basis for an information program. Information will be directed to the public, particularly electors, cooperators, landowners-managers-occupiers-developers, legislators, county commissioners, conservation agencies and organizations, schools, churches, libraries, and planning and development agencies.

6. Problems and Opportunities

The District program (plan) identifies the conservation problems and opportunities recognized by supervisors, cooperating agencies, and advisory groups and outlines measures to correct the problems and/or develop wise management of natural resources. This program attempts to give a history of the District, to explain and evaluate the present condition of the natural resources (soil, water, vegetation, and wildlife), the opportunities that exist to protect and develop these resources, and the policies, goals and objectives, and working procedures of the supervisors. This program gives consideration to all private and public lands.

Jurisdiction

1. Private Lands

Basically, the District program has jurisdiction in the private ownership land area and deals with water, soil, and related resources. It has, as overall objectives, the treatment of each acre according to its needs and the use of each acre within its capabilities.

2. Public Lands

Mutual problems and opportunities for the conservation, development, and use of public lands are intended to be correlated with the public land administrators, managers, and users.

Method

Land occupiers voluntarily sign cooperative agreements and agree to develop and carry out a conservation plan with such assistance as may be provided by the District and other agencies working through the District. There are also mandatory provisions in the CD law for land use regulations and sediment control.

Authorizations

The District program is authorized under provisions of the Montana Conservation Districts Law, Sections 76-101 to 76-233, R.C.M. 1947 as amended, and particularly Section 76-108(8). Programs are required in

Memoranda of Understanding or other appropriate agreements. The District has agreements with the following:

U.S. Department of Agriculture dated February 1964
Soil Conservation Service dated March 1977
Forest Service dated May 1957
U.S. Department of Interior dated February 1964
Montana Department of State Lands dated December 7, 1978
Montana Fish and Game Commission dated 1970
Montana Extension Service dated 1949
Montana Department of Natural Resources and Conservation dated February 1973
U.S. Dept. of the Army dated August 1976
Montana State Forestries Office dated February 1966

Information working relations have been established or are desired for cooperation and assistance from the following:

Federal: U.S. Department of Health, Education and Welfare
U.S. Department of Commerce, Office of Economic Opportunity
U.S. Department of Housing and Urban Development
U.S. Department of Labor, Economic Development Administration (EDA)
U.S. Environmental Protection Agency
U.S. Army Corps of Engineers
U.S. Air Force (SAC)

State: Montana Highway Commission
Montana Environmental Quality Council
Employment Security Commission
Montana Department of Intergovernmental Relations
Montana Department of Health and Environmental Sciences
Montana Department of State Lands

Local: County Commissioners
City Councils
City-County Planning Board
County Planning Board
School Districts

Other Legislation

Other major laws which relate to the District program are:

1. P. L. 46, Soil Conservation and Domestic Allotment Act of 1936. (USDA Secretary's Memorandum No. 1488 of February 1, 1962);

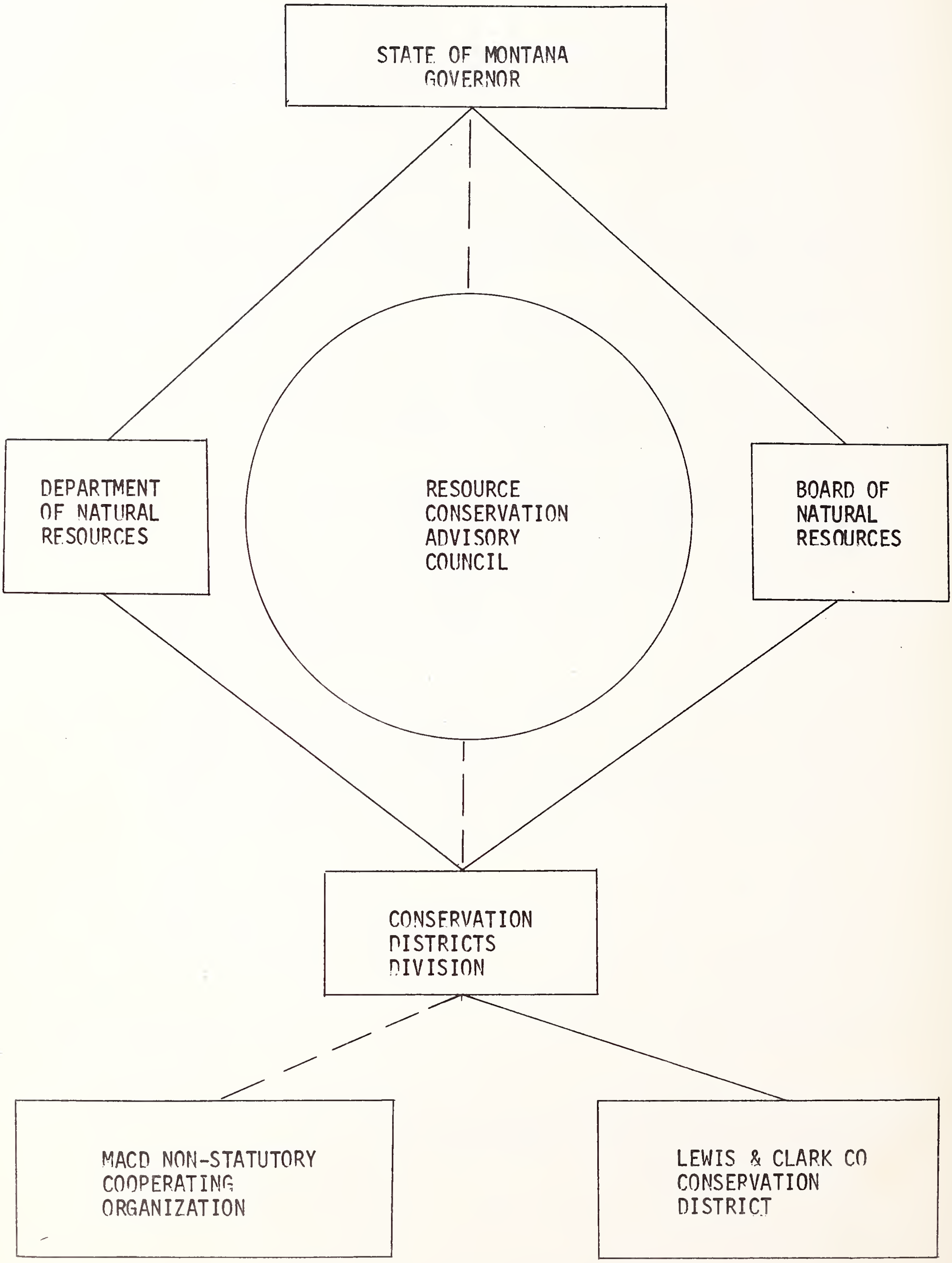
2. P. L. 566, Watershed Protection and Flood Prevention Act of 1954;

3. P. L. 87-703, Section 102 of the Food and Agriculture Act of 1962, Resource Conservation and Development Program;

4. P. L. 91-190, National Environmental Policy, January 1, 1970,
5. P. L. 92-500, Federal Water Pollution Control Act of 1972;
6. P. L. 92-419, Rural Development Act of 1972,
7. P. L. 93-86, Title X, Agriculture and Consumer Protection Act of 1973,
8. Water Quality Rules and Regulations of Department of Health and Environmental Sciences;
9. Floodplain Rules and Regulations of Montana Department of Natural Resources and Conservation;
10. State Subdivision and Planning Act of the Montana Department of Intergovernmental Relations and County Commissioners;
11. Montana Water Use Act of 1973;
12. Montana Major Facility Siting Act (House Bill 581),
13. Montana Strip and Underground Mine Reclamation Act,
14. Revenue Sharing by Conservation Districts (Senate Bill 141);
15. Montana Economic Land Development Act (Senate Bill 672),
16. Renewable Resource Development Program (Senate Bill 642);
17. Natural Streambed and Land Preservation Act (Senate Bill 310);
18. Lake Shore Protection (Senate Bill 175);
19. Saline Seep Program on State Lands (House Bill 33);
20. Montana Weed Control Law;
21. Department to Inspect Dams, Dikes and Reservoirs (Senate Bill 337);
22. Defining Agricultural Land (House Bill 488); and
23. Open Space Land and Voluntary Conservation Easement Act (House Bill 341).

District Relationship to State Government

(see following chart)


STATE OF MONTANA GOVERNOR
DEPARTMENT OF NATURAL RESOURCES
RESOURCE CONSERVATION ADVISORY COUNCIL
BOARD OF NATURAL RESOURCES
CONSERVATION DISTRICTS DIVISION
MACD NON-STATUTORY COOPERATING ORGANIZATION
LEWIS & CLARK CO CONSERVATION DISTRICT

THE SOIL AND WATER RESOURCES CONSERVATION ACT OF 1977

The Soil and Water Resources Conservation Act of 1977 (Public Law 95-192) was enacted November 18, 1977. The Act, commonly known as RCA, directed the Secretary of Agriculture to report on the status and condition of the nation's soil, water, and related resources and to prepare a soil and water conservation program based on that appraisal.

The purpose of the RCA was to ensure that USDA programs for the conservation of soil, water, and related resources are responsive to the short- and long-term needs of the nation. It was designed to serve as a guide in carrying out the activities of the Soil Conservation Service.

The Resources Conservation Act is a companion measure to the Resources Planning Act of 1974, which covers state and federal forested lands and is administered by the U.S. Forest Service. RCA is to cover the nation's private and nonfederal lands. These two laws give USDA authority to make a comprehensive appraisal of America's basic natural resources.

SCS, through cooperative arrangements with conservation districts, state natural resource agencies, and other agencies and the public, has outlined a program for implementation of this Act.

The appraisal required by the RCA involves data on the quality and quantity of soil, water, and related resources; the capability and limitations of those resources: changes in resource condition resulting from new farm technology; the desirability and feasibility of disposing of organic wastes on land; the costs and benefits of alternative soil and water conservation practices; alternative irrigation techniques; and current federal and state laws, policies, programs, regulations, and other considerations relating to resource use, conservation, and development.

At the local level, a questionnaire was distributed throughout the county directed at the various areas contained under RCA and problems which are of major concern to the residents of the county. The primary purpose of RCA was to get public input on problem areas, to obtain ideas from knowledgeable local people in identifying resource problems, to propose workable programs, and to verify local data.

The two main purposes of the appraisal are to provide the most accurate, up-to-date resource knowledge available and to serve as a basis for developing the five-year soil and water conservation program required by RCA. The Act requires only the development of a national program. It allows States and Districts to develop their individual programs if they so desire.

The first report from the President to Congress will be on the first day that Congress convenes in 1980. Following this, the Secretary of Agriculture will report annually to Congress through the President on the program's effectiveness in attaining the purposes of the Act.

The major concerns of people residing in Lewis and Clark County as gathered from a questionnaire distributed throughout the county were as follows:

- Loss of production acres for food and fiber production.
- Land use, including urban sprawl, migration to rural areas, and public ownership.
- Conversion to irreversible uses and stripping of mineral resources from prime, unique, or important farmland.
- Irrigation water management, including water availability, efficiency of systems and application, and erosion.
- Water supply, including the problems caused by sediment and related pollutants, lack of water, depletion of ground water, and surface storage.
- Water erosion on cropland, pastureland, forestland, rangeland, urban and mined land, as well as sediment damages and impacts on water quality.
- Water quality and sediment damages related to mining activities.
- Land disposal of organic waste, including municipal sludge, health hazards, environmental pollution, and lack of available sites.
- Recreation, including increased demand, lack of diversity, operation and maintenance of existing areas, and lack of facilities.
- Wildlife habitat, including the effect of farm and forestry cultural practices, land use conversions, and loss of habitat through overgrazing.
- Fish habitat, including the impact of sediment and related pollutants, availability of habitat, effect of human activity, and channel modifications.
- Forestry on non-federal lands, including land use conversions, lack of markets, erosion control, overgrazing, and need for reforestation.
- Water quality, including sediment and related pollutants, eutrophication, livestock wastes, and the impact of irrigation.
- Rural development, including land held for development, viability of the family farm/ranch, lack of availability of agrictural products, population migration, and adequacy of facilities and services.
- Environment, including lack of habitat for threatened and endangered species, loss of riparian vegetation, loss of wildlife migration routes, and loss of windbreaks.
- Social/political concerns, including effective local leadership, adequate legislative authorities, effective use of authorities, adequate local capital, capability of local units of government to meet resource needs, and need for cooperative arrangements with other units of government.

The major items of concern shown by the questionnaire in Lewis & Clark County were in the social/political area.

Results of the questionnaire were given to the local SCS office for their use in reporting local participation and views. This data was consolidated in the Montana SCS report to the Secretary of Agriculture.

DISTRICT REPSONSIBILITIES

Supervisor Responsibilities and Authorities

Supervisors are elected by the qualified electors of a Conservation District. Legislative action of the 1977 general assembly approved an amendment to the Conservation District Law which mandates that supervisors will be elected in the general election similar to other county officials.

Supervisors are the governing body of the Conservation District with broad authorities as outlined in the Conservation District Law. The law enables the supervisors to develop and carry out a resource conservation and development program in the District. It is the policy of the Conservation District to cooperate with and use the services of other agencies for technical, educational, and financial assistance to the appropriate landusers to plan and apply conservation practices.

Specific duties of Conservation District Supervisors are as follows:

1. Furnishing effective local leadership in the form of a properly constituted governing body.
2. Holding regular and special meetings to plan and carry out work and to determine community needs and priorities for conservation and resource development.
3. Developing a long range program that recognizes the interests of all the people in the District and is compatible with the area or regional development plans and state resource plans.
4. Developing, with the help from agencies, an annual work plan within the framework of the long range program, stating what will be done to reach objectives and accomplish work scheduled for the year ahead.
5. Enlisting needed assistance from whatever source is available.
6. Coordinating the several conservation and resource development programs which may operate within the District.
7. Determining priorities for Soil Conservation Service and other assistance to individuals, informal groups, public bodies, private organizations, and other District cooperators.
8. Supervising employees of the District.
9. Managing all funds, facilities, and equipment belonging to the District.
10. Cooperating with other Districts in multi-district resource activities, such as comprehensive planning, watershed development, river basin programs, and other resource development projects.

11. Correlation of District programs with those of other agencies engaged in resource planning and development, such as planning commissions, economic development districts, councils of government, irrigation and drainage districts, state planning and development districts, local planning boards, regional planning commissions, county water and sewer districts and flood control districts.

12. Reporting to the public on resource conservation needs and progress of the work in the District.

13. Following up with cooperators to insure effectiveness of the program.

14. Administering the Natural Streambed and Land Preservation Act in cooperation with the landuser and the Montana Fish and Game Department. (See Appendix, Exhibit 1.)

15. Administering the Sediment Control Program of the District in accordance with the provisions of an ordinance authorized by the Montana Conservation District Law. (See Appendix, Exhibits 2, 3, & 4.)

16. Providing leadership in accepting the provisions associated with being a management agency for implementation of 208 planning in the Conservation District. (See Appendix, Exhibit 5.)

People working together in developing district programs.

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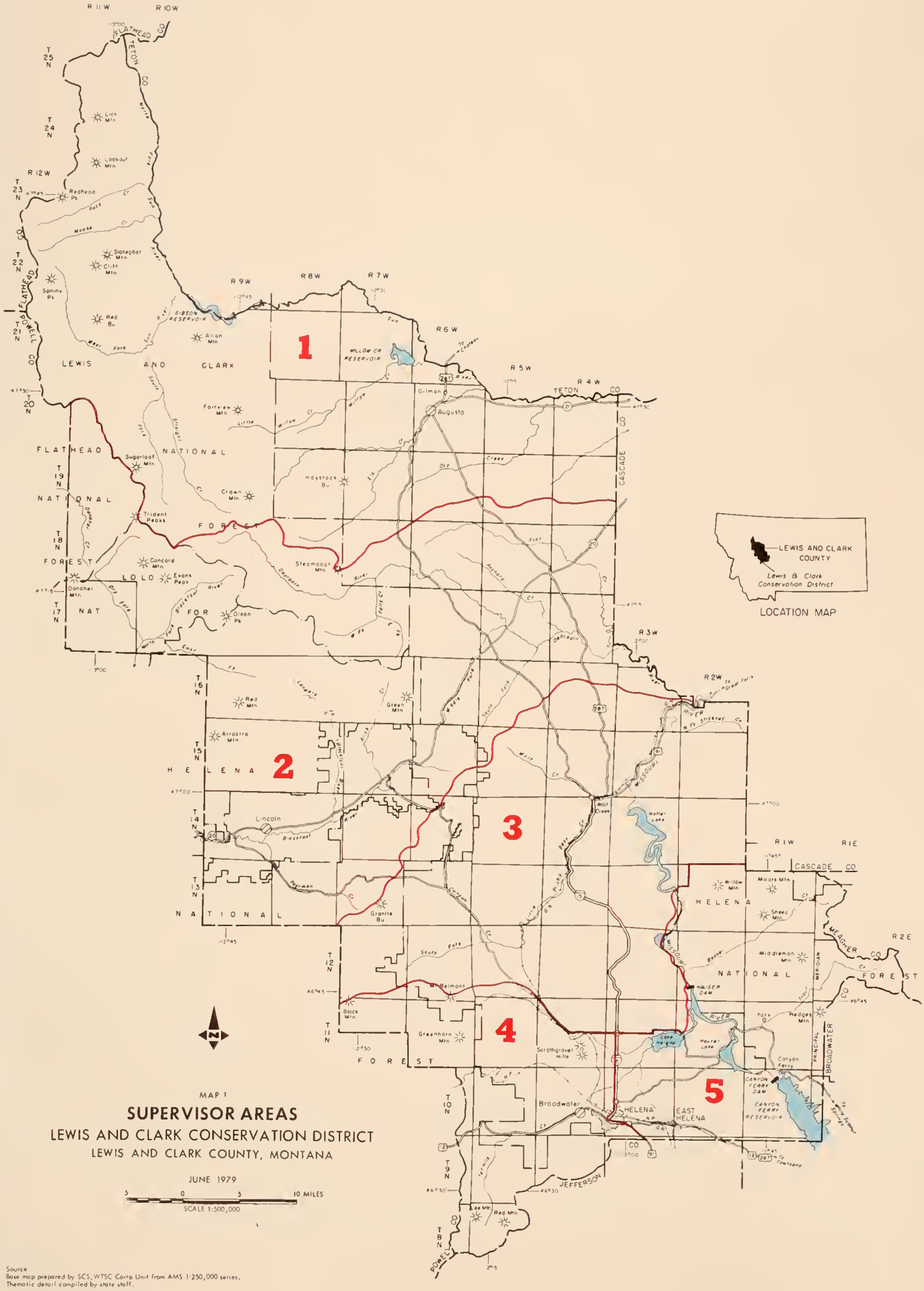

MAP 1

SUPERVISOR AREAS

LEWIS AND CLARK CONSERVATION DISTRICT

LEWIS AND CLARK COUNTY, MONTANA

JUNE 1979

5 0 5 10 MILES
SCALE 1:500,000

Source
Base map prepared by SCS, WTSC Carto Unit from AMS 1:250,000 series.
Thematic detail compiled by state staff.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

M7-EN-24053-1

III DISTRICT POLICIES

DISTRICT POLICIES

It is the policy of the Lewis and Clark County Conservation District to actively involve the private and public sectors of our community in an annual program to maintain and improve the resources of our District.

To accomplish this we will need to: prevent floodwater and sediment damage, impairments to dams and reservoirs, protect the tax base, protect the private and public lands, and provide direct assistance for the establishment of environmental policies and programs of the State. Relative to natural resources use and development, we will provide the needed assistance in the implementation of those policies and regulations as provided in various State and Federal statutes.

Specifically, the Lewis and Clark County Conservation District hereby adopts the following policies for implementation of resource planning programs.

A. Implement an accelerated information and education program to convey a basic understanding of the needs for the proper land treatment for all segments of society.

B. Promote community involvement and participation in the development of all land use policies. Citizen support and understanding is essential in this area.

C. Implement programs and policies to insure landusers rights to economic opportunity and freedom of choice in the use of lands. This right is valid as long as it does not destroy the resource or cause conflicts with a safe, clean and healthy environment for all of society.

D. The needs and desires of all people will be considered to provide a quality environment that is an attractive, convenient and satisfying place to live, work and play.

E. Promote land use policies that protect the aesthetic values of our community, which are an integral part of our history and way of life.

F. Promote the use of the cooperative soil survey in making sound land use decisions or when increasing the intensity of land use.

G. Promote land use policies that consider the impact and influence of the property tax structure.

H. Implement programs to develop and improve the rangeland resource for maximum protection of the soil and grass resource. This will be a primary effort toward the prevention and reduction of sediment pollution of water.

I. Provide administration to programs that direct improvement in water quality. The attainment of maximum beneficial use without abuse will be encouraged for all surface and ground water resources.

J. Provide assistance to County planning boards, County Commissioners and others in the preservation of lands within the County that are important to agriculture.

K. Provide technical assistance for the treatment and reclamation of mined lands.

L. Develop a system of periodic review of land use policies and plans to determine changes in the land resource which are consistent with environmental and social needs.

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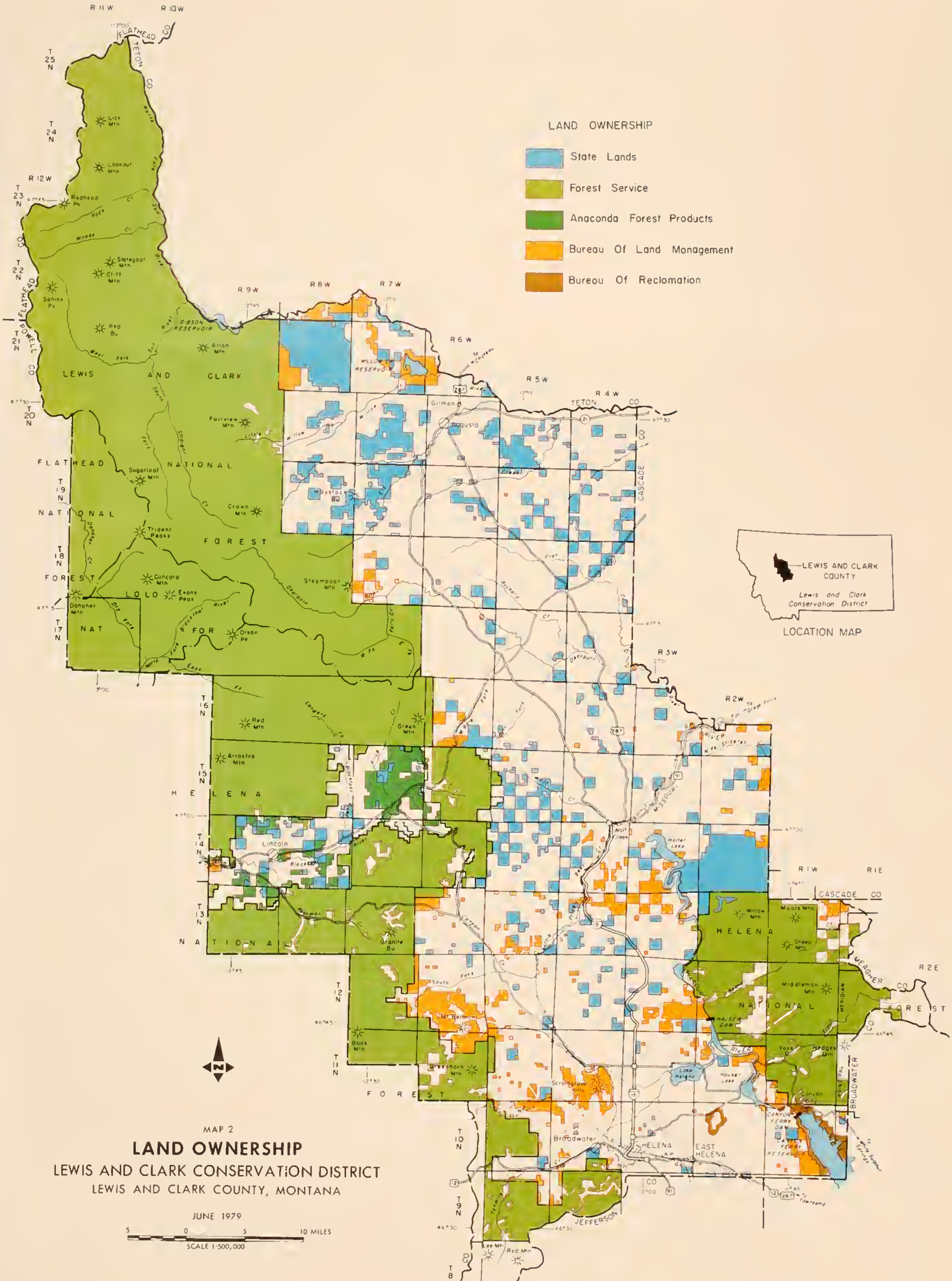
IV NATURAL RESOURCE INVENTORY



MAP 2

LAND OWNERSHIP

LEWIS AND CLARK CONSERVATION DISTRICT
LEWIS AND CLARK COUNTY, MONTANA

JUNE 1979

5 0 5 10 MILES
SCALE 1:500,000

Source
Base map prepared by SCS, WTSC Carto Unit from AMS 1:250,000 series.
Thematic detail compiled by state staff.

U S DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

M7-EN-24053-2

CLIMATE OF LEWIS AND CLARK COUNTY

Extending from latitude 46° 23' south of Unionville northward to 47° 59' at the headwaters of the North Fork of the Sun River, and having the Continental Divide either within its boundaries or along the western edge throughout the entire length, it is not surprising that topography plays a large part in the pattern of climate in Lewis and Clark County. The Missouri River runs through rugged hills in the southeastern part of the county, and the Sun River forms much of the northern boundary. Much of Canyon Ferry Reservoir lies within the southeast corner. The county is one of the most mountainous in Montana, containing fairly large valley areas only around Helena, along the Sun River in the Augusta area, below Holter Dam to the Cascade County line, and to a lesser extent on the Blackfoot River near Lincoln. The latter area, incidentally, lies west of the Continental Divide. Differences in climate within the county are fairly large, as should be expected from the topography and from the distance (almost 100 miles airline) between southern and northern extremities.

There have been several stations keeping records of temperature and/or precipitation during recent years, and fairly long records are on file for Helena, East Helena, Canyon Ferry, Helena 5 NNW, Canyon Creek, Holter Dam, Gibson Dam, and Augusta. Records are on hand for shorter periods for Austin 1 W, Unionville, Rogers Pass, Lincoln, and Lincoln 14 NE. These records give a fair sampling of county climate, except that the more mountainous areas are represented only by the very short periods of record from Unionville, Austin 1 W, and Rogers Pass, and by the fairly long record at Gibson Dam.

The county's climate, while following to some degree the pattern of other Montana counties on the east slopes of the Continental Divide, varies widely from the warmer lower elevations along the Missouri River below Holter Dam to the colder higher elevations on the headwaters of such streams as the Sun River, Blackfoot River, and Tenmile and Prickly Pear Creeks. Precipitation also varies widely from the semiarid totals measured in some parts of the Helena and Canyon Creek areas to fairly large amounts at higher elevations. Along with these basic variations, wind conditions very often differ greatly from the Sun River area to the more sheltered valleys around Helena, particularly during the winter. When winter "chinooks" start to blow along the Sun River, warming can be sudden and amount to as much as 50° F in a few hours. Usually, however, these warm winds do not penetrate the cool air layer in the Helena Valley for several hours, or even days, and sometimes the "chinook" will not reach the valley floors in the southern third of the county.

Although the usual seasonal precipitation pattern is similar to that of much of the eastern slope area of Montana, there are important differences in the higher elevations along the Continental Divide. While the valleys receive normally from two-thirds to three-fourths of their annual precipitation during the growing season, with definite seasonal peaks in May and June and again in September, the mountain areas and the Blackfoot Valley have another important peak during the winter months.

This winter high elevation precipitation peak coincides with the normal accumulation of mountain snowpacks which show up each April-June period in increased stream flow. In the valleys the winter months normally are quite dry--the annual snowfall average for Helena 6 N is only 24.8 inches a year. In the mountain areas, however, snowfall is usually quite heavy--254 inches fell during 1955 at Rogers Pass.

Most of the year's cloudy weather over the valleys occurs with the spring rains, but in the mountain sections, cloudy weather is the rule from late fall well into the following summer. Steady type rains or snows don't occur very frequently over the valleys, but when they do they are associated with wintertime cold waves (snow) or with the rainy May-June season. Most summer precipitation over the valleys falls in showers. High relative humidities rarely are observed, and when they do occur, they are observed with temperatures well below the oppressive range. Severe storms seldom occur, but the "chinook" westerlies or southwesterlies sometimes become very strong (infrequently of hurricane strength) along the Sun River slopes. Hail sometimes causes some crop damage locally during the growing season, and lightning strikes occasionally damage power installations. There is no record of tornado damage in the county, and the very few funnel clouds reported over the years have been observed in open country.

Length of the average freeze-free season varies widely--from 139 days at Holter Dam and 134 days at Helena to 104 days at Augusta and 87 days at Gibson Dam. During almost all winter seasons there are a few invasions of cold air from the north during which temperatures usually fall to zero or below. The below zero cold usually lasts only for a few days, but in a few years at least one of these cold spells has lasted a week or more. Snow and blowing snow sometimes accompany these cold waves, mostly in northern parts of the county. On the other hand, the cold waves usually "break" first in these same northern areas. Coldest temperature on record in Lewis and Clark County is 69.7° below zero, recorded on January 20, 1954 at Rogers Pass (national record low). The warmest on record in the county was 108° on July 30, 1936 at Holter Dam.

Climate of the Helena Valley

Located just east of the Continental Divide, the Helena Valley has a climate best described as modified continental. Several factors which modify the continental climate characteristics are invasion by Pacific Ocean air masses, drainage of cool air into the valley from surrounding mountains, and the protecting mountain shield in all directions which makes temperature changes somewhat smaller than those experienced over the Montana plains. The mountains to the north and east deflect some of the shallow masses of invading cold arctic air to the east. Following cold periods, cold air may remain trapped in the Helena Valley for several days after much of Eastern Montana has warmed. Strong temperature inversions are present in the valley during these periods and during extreme cold spells.

Precipitation averages 10.95 inches a year at the Helena Airport with the city receiving slightly more precipitation, and the northern and eastern sections of the valley slightly less. June is the wettest month averaging 2.23 inches. In the last 30 years, 1935 was the driest with 6.28 inches of precipitation occurring and 1938 was the wettest with 16.09 inches.

Temperatures are more mild in the winter and cooler in the summer than those experienced over the Montana plains; however, several short periods of below zero temperatures occur each winter. Temperatures fall below zero on an average of 21 days a year. Average maximum temperature in January is 29° and the average minimum is 8°. The lowest recorded temperature is -42° F. Snowfall averages 49 inches annually with December and January being the snowiest months. Snowfall during each of these two months averages 9 inches.

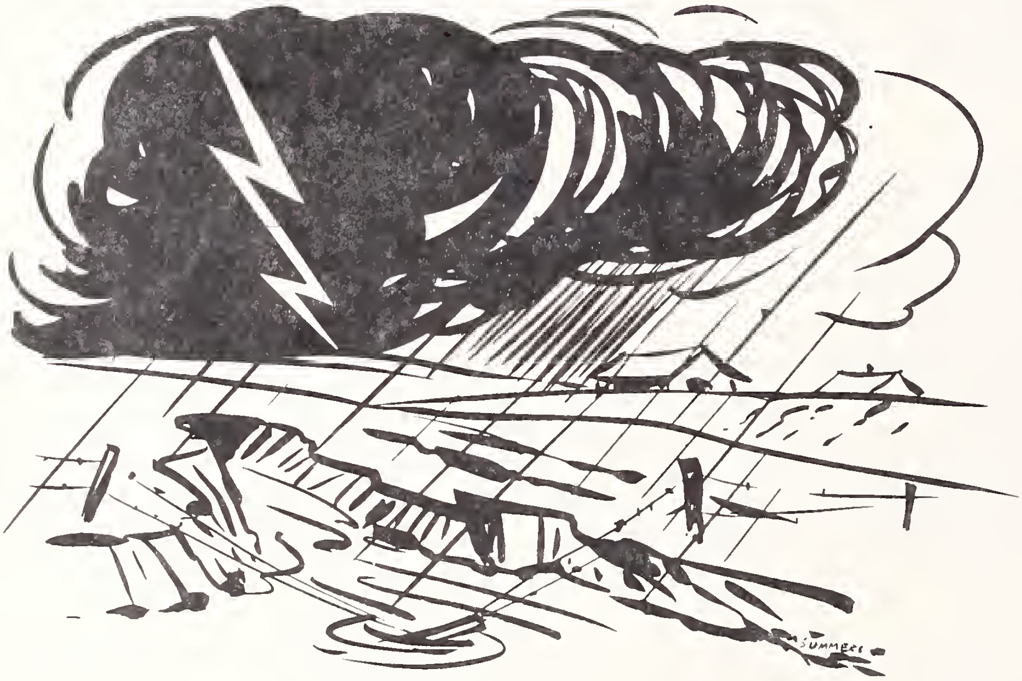
Mild days and cool nights with occasional thunderstorms are characteristic of summer with the average daily July maximum temperature being 84° and the average minimum 52°. Oppressively hot weather is rare as the temperature reaches 90° an average of 20 times a year and 100° on rare occasions each year. The highest recorded temperature is 105°. The length of growing season averages about 134 days between the last occurrence of 32° in spring and the first recorded 32° in the fall.

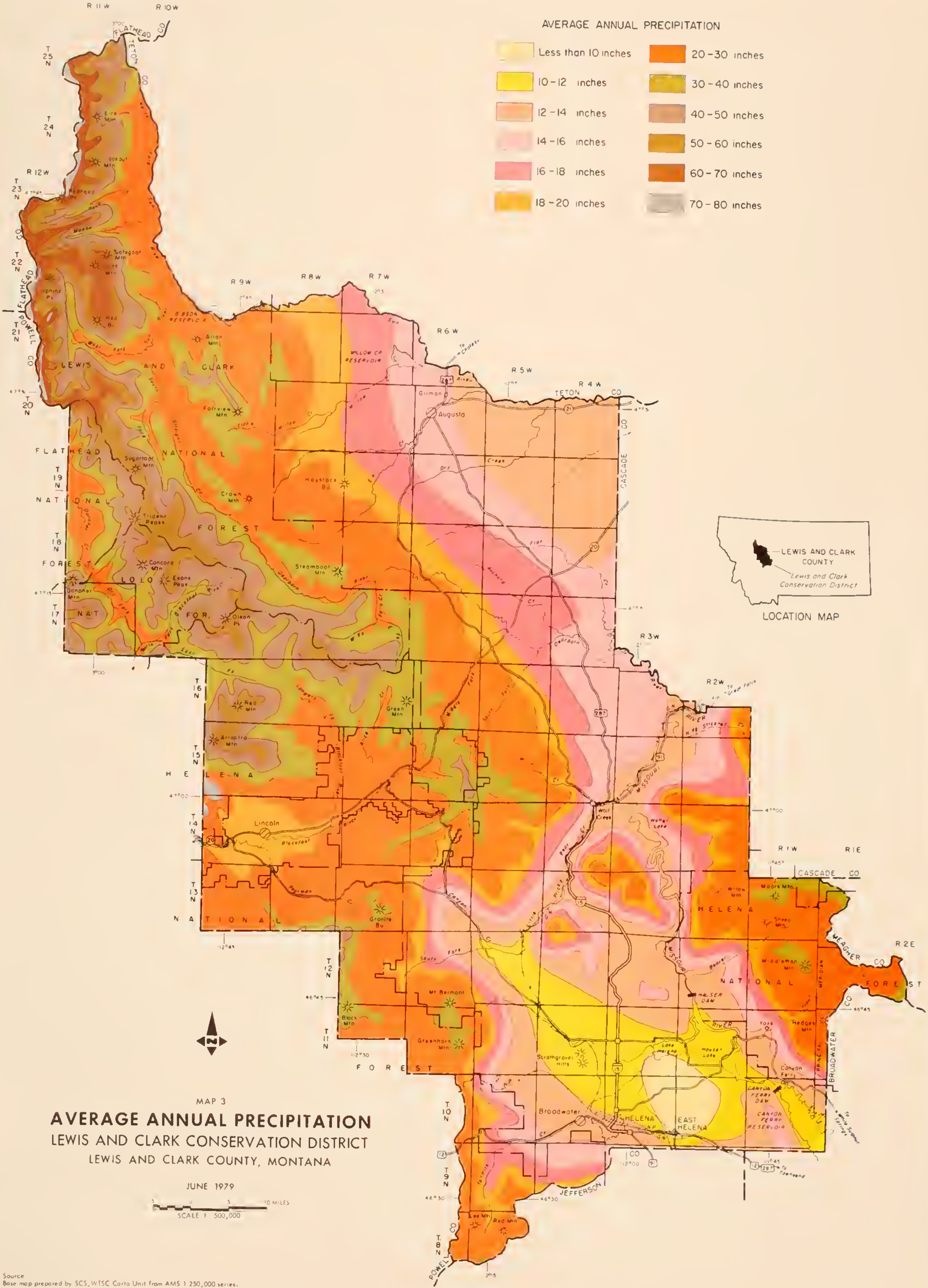
Climate of the Blackfoot River Valley

Located just west of the Continental Divide, the Blackfoot River Valley has some characteristics of both the modified maritime climate typical of western Montana valleys and the more continental type climate of eastern Montana. Precipitation averages 18.36 inches a year at the Lincoln Ranger Station and is fairly evenly distributed throughout the year. June is the wettest month averaging 2.70 inches followed by May with 2.19 inches. In 21 years of records at the Lincoln Ranger Station, 1960 was the wettest with 25.08 inches. Snowfall averages 108 inches annually with the 24.5 inches received in January making it the snowiest month.

Temperatures are more mild in the winter and cooler in the summer than those experienced over the Montana plains; however, several short periods of below zero temperatures occur each winter. The infrequent occurrences of very cold air are usually caused by arctic air over the plains becoming deep enough to spill westward across the Continental Divide. The invasions of cold air into the valley can be accompanied by strong easterly winds and blizzard conditions. Severely cold weather generally lasts only a few days. The average maximum temperature in January is 29° and the average minimum is 9°. The lowest recorded temperature is -48° F.

Mild days and cool nights with occasional thunderstorms are characteristics of summer with the average daily July maximum temperature being 82° and the average minimum 41°. Oppressively hot weather is almost unknown as the highest recorded temperature is 102°. Strong nighttime radiational cooling causes freezing or near-freezing temperatures during each month of the summer, so the commonly used term "growing season" is almost meaningless in this valley. There is an average of 71 days between the last occurrence of 28° in the spring and the first recorded 28° in the late summer. Thus vegetation is generally limited to the more hardy varieties.





AVERAGE ANNUAL PRECIPITATION

Less than 10 inches	20 - 30 inches
10 - 12 inches	30 - 40 inches
12 - 14 inches	40 - 50 inches
14 - 16 inches	50 - 60 inches
16 - 18 inches	60 - 70 inches
18 - 20 inches	70 - 80 inches

MAP 3

AVERAGE ANNUAL PRECIPITATION
LEWIS AND CLARK CONSERVATION DISTRICT
LEWIS AND CLARK COUNTY, MONTANA

JUNE 1979

5 0 5 10 MILES
SCALE 1 500,000

Source
Base map prepared by SCS, WTSC Carto Unit from AMS 1 250,000 series.
Thematic detail compiled by state staff.

U S DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

M7-EN-24053-3

LAND USE - 1979

The following definitions correlate the existing land use map for the Lewis and Clark County Conservation District. **Not all copies of this plan will include the map. If this copy does not contain a map inserted in the back cover, you may contact the District office to obtain one.**

URBAN AND BUILT-UP AREAS Land for commercial, light industrial, high density residential, and associated uses. Included are all lands within the municipal boundaries of incorporated cities and towns and those lands in unincorporated areas devoted to commercial and light industrial uses or where residential structures or parcels occur at an intensity of at least one per two acres.

RURAL AND SUBURBAN TRACTS Areas of land divided into parcels of more than two acres but not larger than quarter-quarter aliquot parts of sections (approximately 40 acres). "Divided into parcels" means those parcels created by certificates of survey, subdivision plats, deeds, contracts for deed, or other instruments of conveyance.

HEAVY INDUSTRY AND UTILITY AREAS Major feed lots and wood, chemical and mineral processing plants requiring a permit from the Department of Health and Environmental Sciences. Uses occupying less than 40 acres are represented by point symbols.

MINERAL EXTRACTION AREAS Any operating strip or open cut mining and subsurface mining areas, gravel pits and quarries, tailing and waste areas which require a state operating permit. Point symbols are used for areas under 40 acres where individual mines or gravel pits are shown.

RECREATION USE AREAS Areas on public and private land used primarily for recreation. Ski areas, parks, campgrounds, regularly used trails, and general recreation areas with or without support facilities are included. Recreation areas smaller than 40 acres are shown as point symbols.

IRRIGATED CROPLAND, HAYLAND AND PASTURELAND Land used for the production of vegetables, row crops, grain, and hay using subsurface, flood or sprinkler irrigation.

NON-IRRIGATED CROPLAND All cultivated agricultural land not using irrigation. Land usually used for cultivation, but occasionally used for grazing is classified as non-irrigated cropland. Land which is planted and mowed for hay at regular intervals as well as orchards and Christmas tree plantations are included.

COMMERCIAL FOREST Areas managed for timber harvest. Clear-cut areas and those in various stages of managed growth are included. Tree stands actively being harvested and those that may be harvested are mapped. The timber management activities in these areas include roadbuilding, thinning, slash disposal, tree planting, timber cutting, and cull tree removal. Commercial forest areas on public land and private lands managed by major commercial forest products industries are shown.

FOREST COVER AREAS (The Long Range Plan refers to this category as "Grazeable Woodland.") Coniferous and deciduous tree areas displaying a natural tree canopy or crown cover of 15% or more. This category includes forested areas unsuitable for commercial harvest or those that fall within management areas that preclude harvest.

RANGELAND Native and introduced grassland or shrubland of less than 15% tree cover and eroded areas, steep rocky slopes, barren areas above timberline, and rock outcrops. This includes areas supporting both livestock and foraging wildlife and areas of little value to man because of their unproductive surface conditions.

The primary land use in Lewis & Clark County is rangeland, providing livestock grazing, wildlife habitat, and watershed protection on the major portion of the county.

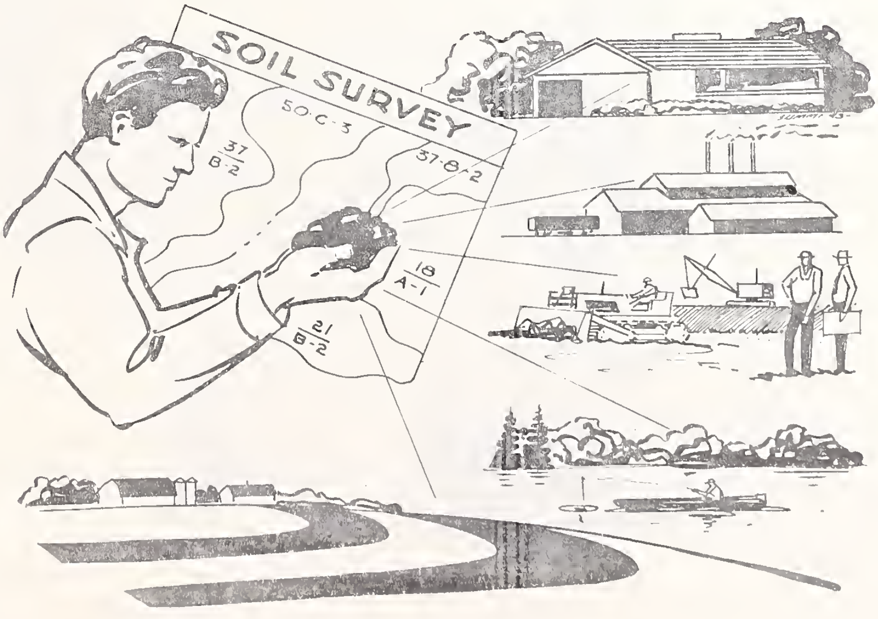
SOILS OF LEWIS AND CLARK COUNTY

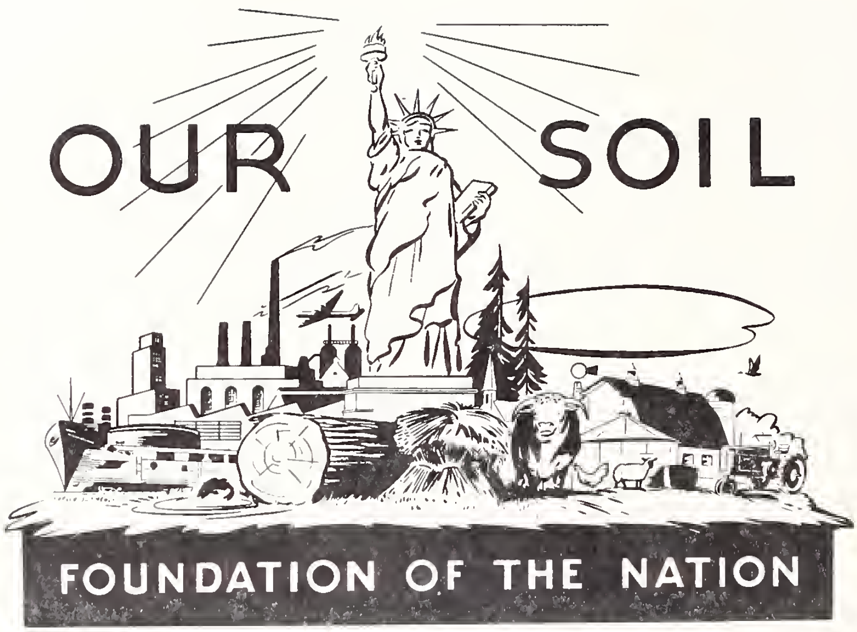
Soil information is useful to all people, directly or indirectly. Its importance to farmers, ranchers, and foresters has long been recognized, and now city people are beginning to realize how much influence it has on both their home and business life.

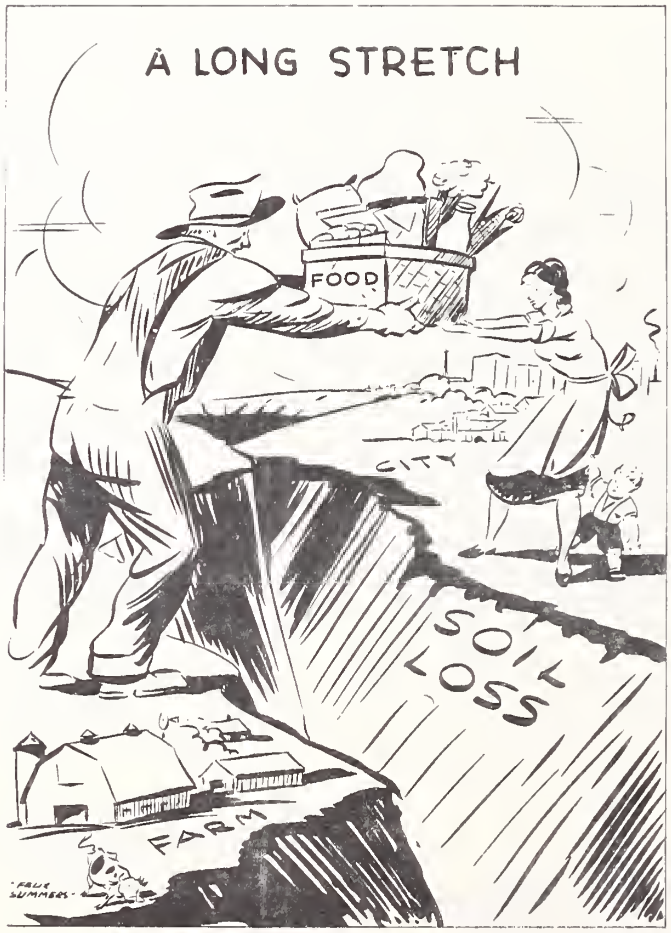
The identification of soil differences in the field and understanding these differences allows the land user the opportunity for economic benefits, and insures that the land is used and managed according to its capability.

A good understanding of soil differences requires a basic knowledge of soil properties. (1) Soil texture is a term used to indicate the relative proportions of clay, silt, and sand in the soil. (2) Soil pH expresses the intensity of acidity or alkalinity of a soil. (3) Soil color expresses the contributing factor of organic matter, iron, and lime. (4) Soil depth is the depth to a layer of material that inhibits root growth. The depth of soil influences the volume of soil available to store water and nutrients for plant growth. (5) Soil structure is the arrangement of primary soil particles (sand, silt, and clay) into distinct natural aggregates. This structure determines the rate that air and water enter and move through the soil.

All users of land need to develop an understanding and an appreciation of soil. The information contained in a soil survey field sheet or standard soil survey should direct the proper planning and development of all uses of land. Soils are the basic resource and deserve the primary consideration if any venture is to be successful, whether it be a small subdivision or a large ranch. Consider the soil first is a motto that every user of land should have imprinted firmly in his mind.




OUR SOIL
FOUNDATION OF THE NATION


A LONG STRETCH
FOOD
CITY
SOIL LOSS
FARM
PAUL SUMMERS

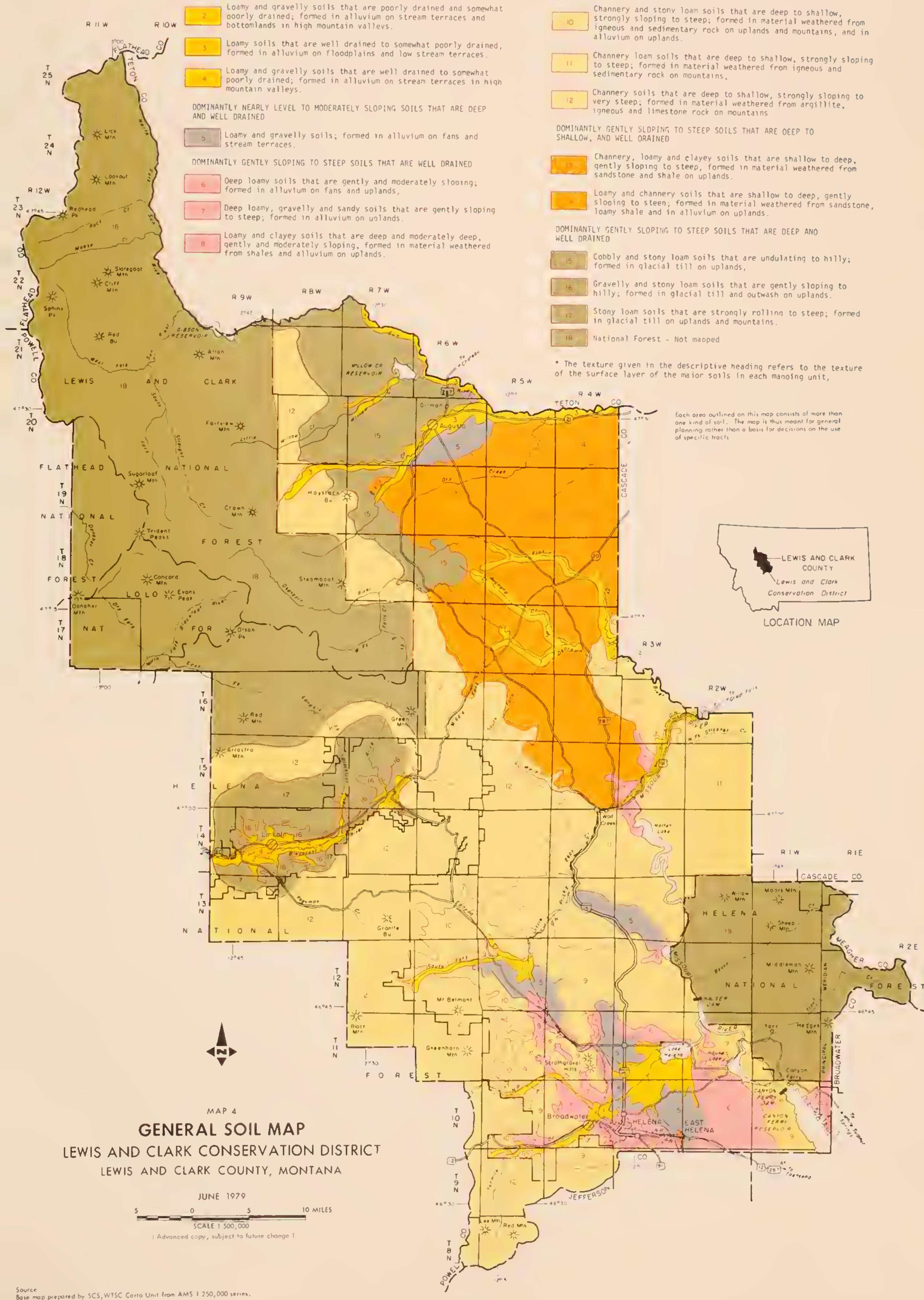
MAP 4

GENERAL SOIL MAP

LEWIS AND CLARK CONSERVATION DISTRICT

LEWIS AND CLARK COUNTY, MONTANA

JUNE 1979



SCALE 1 500,000

(Advanced copy, subject to future change)

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

LOCATION MAP

MAPPING UNITS *

DOMINANTLY NEARLY LEVEL SOILS THAT ARE DEEP AND WELL DRAINED TO VERY POORLY DRAINED: SUBJECT TO FLOODING

1	Loamy soils that are poorly drained and somewhat poorly drained; formed in alluvium on low stream terraces and bottomlands.
2	Loamy and gravelly soils that are poorly drained and somewhat poorly drained; formed in alluvium on stream terraces and bottomlands in high mountain valleys.
3	Loamy soils that are well drained to somewhat poorly drained, formed in alluvium on floodplains and low stream terraces.
4	Loamy and gravelly soils that are well drained to somewhat poorly drained; formed in alluvium on stream terraces in high mountain valleys.

DOMINANTLY NEARLY LEVEL TO MODERATELY SLOPING SOILS THAT ARE DEEP AND WELL DRAINED

5	Loamy and gravelly soils; formed in alluvium on fans and stream terraces.

DOMINANTLY GENTLY SLOPING TO STEEP SOILS THAT ARE WELL DRAINED

6	Deep loamy soils that are gently and moderately sloping; formed in alluvium on fans and uplands,
7	Deep loamy, gravelly and sandy soils that are gently sloping to steep; formed in alluvium on uplands.
8	Loamy and clayey soils that are deep and moderately deep, gently and moderately sloping, formed in material weathered from shales and alluvium on uplands.

DOMINANTLY STRONGLY SLOPING TO VERY STEEP SOILS THAT ARE SHALLOW TO DEEP AND WELL DRAINED

9	Channery loam soils that are moderately deep and shallow, strongly sloping to steep; formed in material weathered from limestone and argillite rock on uplands and mountains
10	Channery and stony loam soils that are deep to shallow, strongly sloping to steep; formed in material weathered from igneous and sedimentary rock on uplands and mountains, and in alluvium on uplands.
11	Channery loam soils that are deep to shallow, strongly sloping to steep; formed in material weathered from igneous and sedimentary rock on mountains,
12	Channery soils that are deep to shallow, strongly sloping to very steep; formed in material weathered from argillite, igneous and limestone rock on mountains

DOMINANTLY GENTLY SLOPING TO STEEP SOILS THAT ARE DEEP TO SHALLOW, AND WELL DRAINED

13	Channery, loamy and clayey soils that are shallow to deep, gently sloping to steep, formed in material weathered from sandstone and shale on uplands.
14	Loamy and channery soils that are shallow to deep, gently sloping to steep; formed in material weathered from sandstone, loamy shale and in alluvium on uplands.

DOMINANTLY GENTLY SLOPING TO STEEP SOILS THAT ARE DEEP AND WELL DRAINED

15	Cobbly and stony loam soils that are undulating to hilly; formed in glacial till on uplands,
16	Gravelly and stony loam soils that are gently sloping to hilly; formed in glacial till and outwash on uplands.
17	Stony loam soils that are strongly rolling to steep; formed in glacial till on uplands and mountains.
18	National Forest - Not mapped

* The texture given in the descriptive heading refers to the texture of the surface layer of the major soils in each mapping unit,

Source
Base map prepared by SCS, WTSC Carto Unit from AMS 1 250,000 series.
Thematic detail compiled by state staff.

U S DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

M7-EN-24053-4

LEGEND

General Soil Map*

Lewis and Clark County Area, Montana

DOMINANTLY NEARLY LEVEL SOILS THAT ARE DEEP AND WELL DRAINED TO VERY POORLY DRAINED: SUBJECT TO FLOODING

1 Loamy soils that are poorly drained and somewhat poorly drained, formed in alluvium on low stream terraces and bottomlands.

2 Loamy and gravelly soils that are poorly drained and somewhat poorly drained; formed in alluvium on stream terraces and bottomlands in high mountain valleys.

3 Loamy soils that are well drained to somewhat poorly drained; formed in alluvium on floodplains and low stream terraces.

4 Loamy and gravelly soils that are well drained to somewhat poorly drained; formed in alluvium on stream terraces in high mountain valleys.

DOMINANTLY NEARLY LEVEL TO MODERATELY SLOPING SOILS THAT ARE DEEP AND WELL DRAINED

5 Loamy and gravelly soils; formed in alluvium on fans and stream terraces.

DOMINANTLY GENTLY SLOPING TO STEEP SOILS THAT ARE WELL DRAINED

6 Deep loamy soils that are gently and moderately sloping; formed in alluvium on fans and uplands.

7 Deep loamy, gravelly and sandy soils that are gently sloping to steep; formed in alluvium on uplands.

8 Loamy and clayey soils that are deep and moderately deep, gently and moderately sloping; formed in material weathered from shales and alluvium on uplands.

DOMINANTLY STRONGLY SLOPING TO VERY STEEP SOILS THAT ARE SHALLOW TO DEEP AND WELL DRAINED

9 Channery loam soils that are moderately deep and shallow, strongly sloping to steep; formed in material weathered from limestone and argillite rock on uplands and mountains.

*The texture given in the descriptive heading refers to the texture of the surface layer of the major soils in each mapping unit.

10 Channery and stony loam soils that are deep to shallow, strongly sloping to steep; formed in material weathered from igneous and sedimentary rock on uplands and mountains, and in alluvium on uplands.

11 Channery loam soils that are deep to shallow, strongly sloping to steep; formed in material weathered from igneous and sedimentary rock on mountains.

12 Channery soils that are deep to shallow, strongly sloping to very steep; formed in material weathered from argillite, igneous and limestone rock on mountains.

DOMINANTLY GENTLY SLOPING TO STEEP SOILS THAT ARE DEEP TO SHALLOW, AND WELL DRAINED

13 Channery, loamy and clayey soils that are shallow to deep, gently sloping to steep; formed in material weathered from sandstone and shale on uplands.

14 Loamy and channery soils that are shallow to deep, gently sloping to steep; formed in material weathered from sandstone, loamy shale and in alluvium on uplands.

DOMINANTLY GENTLY SLOPING TO STEEP SOILS THAT ARE DEEP AND WELL DRAINED

15 Cobbly and stony loam soils that are undulating to hilly; formed in glacial till on uplands.

16 Gravelly and stony loam soils that are gently sloping to hilly; formed in glacial till and outwash on uplands.

17 Stony loam soils that are strongly rolling to steep; formed in glacial till on uplands and mountains.

18 National Forest - Not mapped.

LAND CAPABILITY CLASSIFICATION

The soils identified in a detailed soil survey are placed in land capability groupings to indicate the suitability and limitations of the soil for various uses. Soils and climate are considered together as they influence the use and management of a given area.

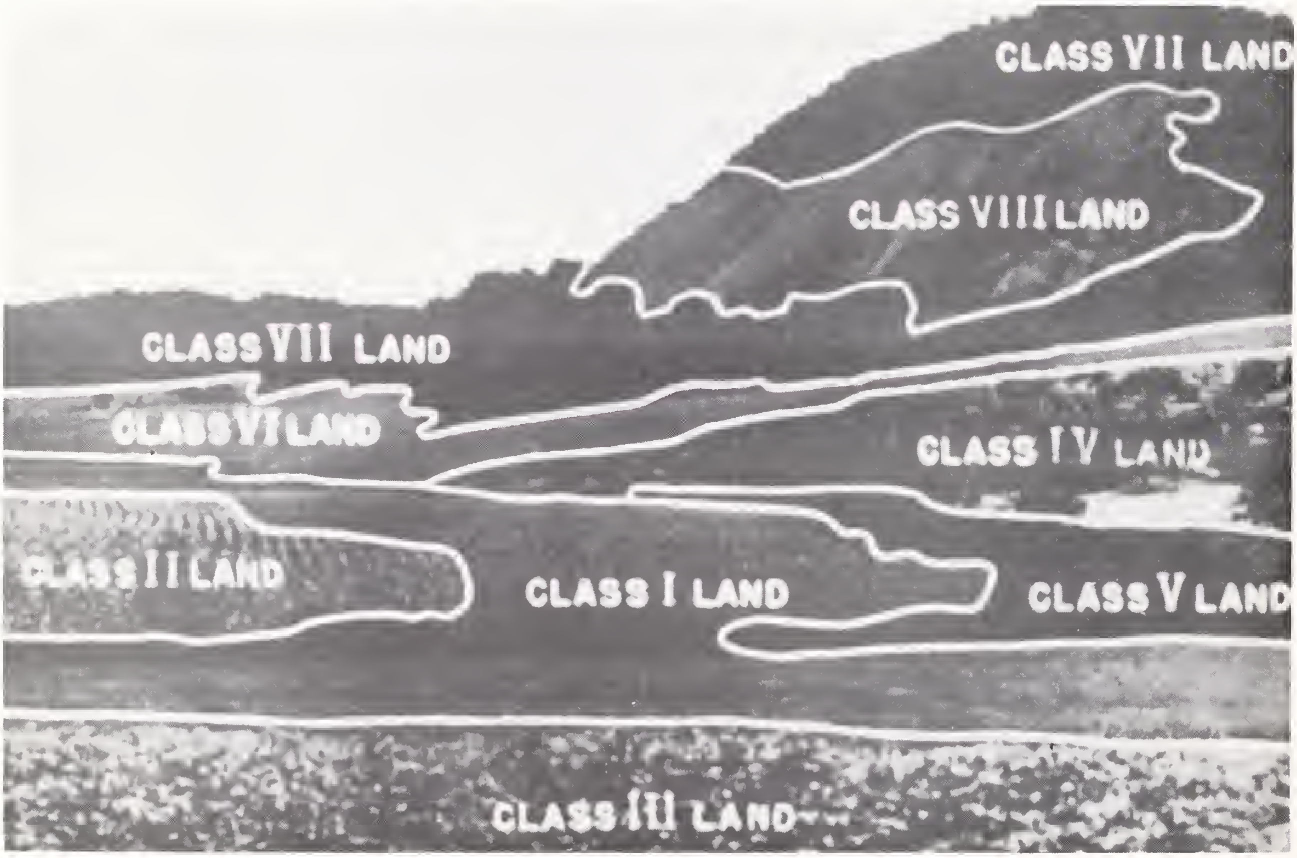
The classification system contains two general divisions: Class 1-4, land that is suited for cultivation and other uses; and Class 5-8, land that is generally not suited for cultivation. The hazards and limitations of the soil for different uses increase as the number increases.

Each capability class has a subclass to show the dominant kind of limitations or hazard affecting the use of the soil. The subclasses are: "e" for erosion hazard, "w" for wetness, "s", for soil root zone limitation and "c", for climatic limitations.

Land suited for cultivation and others uses include:

Class 1	Soils in Class 1 have few or no limitations or hazards. They may be used safely for cultivated crops, pasture, range, woodland, or wildlife.
Class 2	Soils in Class 2 have few limitations or hazards. Simple conservation practices are needed when cultivated. They are suited to cultivated crops, pasture, range, woodland, or wildlife.
Class 3	Soils in Class 3 have more limitations and hazards than those in Class 2. They require more difficult or complex conservation practices when cultivated. They are suited to cultivated crops, pasture, range, woodland, or wildlife.
Class 4	Soils in Class 4 have greater limitations and hazards than Class 3. Still more difficult or complex measures are needed when cultivated. They are suited to cultivated crops, pasture, range, woodland, or wildlife.
Class 5	Soils in Class 5 have little or no erosion hazard but have other limitations that prevent normal tillage for cultivated crops. They are suited to pasture, range, woodland, or wildlife.
Class 6	Soils in Class 6 have severe limitations or hazards that make them generally unsuited for cultivation. They are suited largely to pasture, range, woodland, or wildlife.
Class 7	Soils in Class 7 have very severe limitations or hazards that make them generally unsuited for cultivation. They are suited to grazing, woodland, or wildlife.

Class 8 Soils and land forms in Class 8 have limitations and hazards that prevent their use for cultivated crops, pasture, range, or woodland. They may be used for recreation, wildlife, or water supply.



CONSERVATION NEEDS INVENTORY

The Conservation Needs Inventory is a collection of data relating to land uses and erosion problems. The information is collected by a sampling systems whereby numerous sites are (1) soil mapped and (2) surveyed to evaluate uses, conditions and degree of erosion. From this information an assessment can be made of the potential conservation treatment needed to protect or improve the resources.

The following information is being presented from the results of that inventory in Lewis and Clark County Conservation District.

Consider the information as it relates to a specific question or problem in the context of the method of the survey and the fact that the survey is 10 years old.

CONSERVATION NEEDS INVENTORY DATA
LAND CAPABILITY BY LAND USE

Lewis & Clark County

*Total Land Area - 2,218,240 acres

Land Class	Total	%	Cropland		Hayland		Hay and Past. in Rotation	Pasture		Range	Forest		Other
			Dry	Irrig	Dry	Irrig		Dry	Irrig		Comm	Non-Comm	
2	28,093	2	-0-	3,220	1,024	5,386	3,083	-0-	8,285	6,564	-0-	-0-	531
3	149,664	13	43,377	2,508	3,215	2,826	5,764	461	4,340	85,739	-0-	202	1,233
4	118,777	10	926	356	901	848	828	4,882	1,000	83,000	24,253	1,007	413
5	-0-	0	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
6	537,703	48	373	13,465	-0-	-0-	-0-	657	-0-	348,135	157,281	6,632	11,160
7	230,051	21	-0-	-0-	-0-	-0-	-0-	-0-	-0-	139,352	59,873	30,826	-0-
8	69,102	6	-0-	-0-	-0-	-0-	-0-	-0-	-0-	69,102	-0-	-0-	-0-
Total	1,133,301	100	44,676	19,549	5,140	9,060	9,675	6,000	13,625	732,165	241,407	38,667	13,337

*For the purpose of this inventory, only land primarily used for agriculture was considered (51.09%).

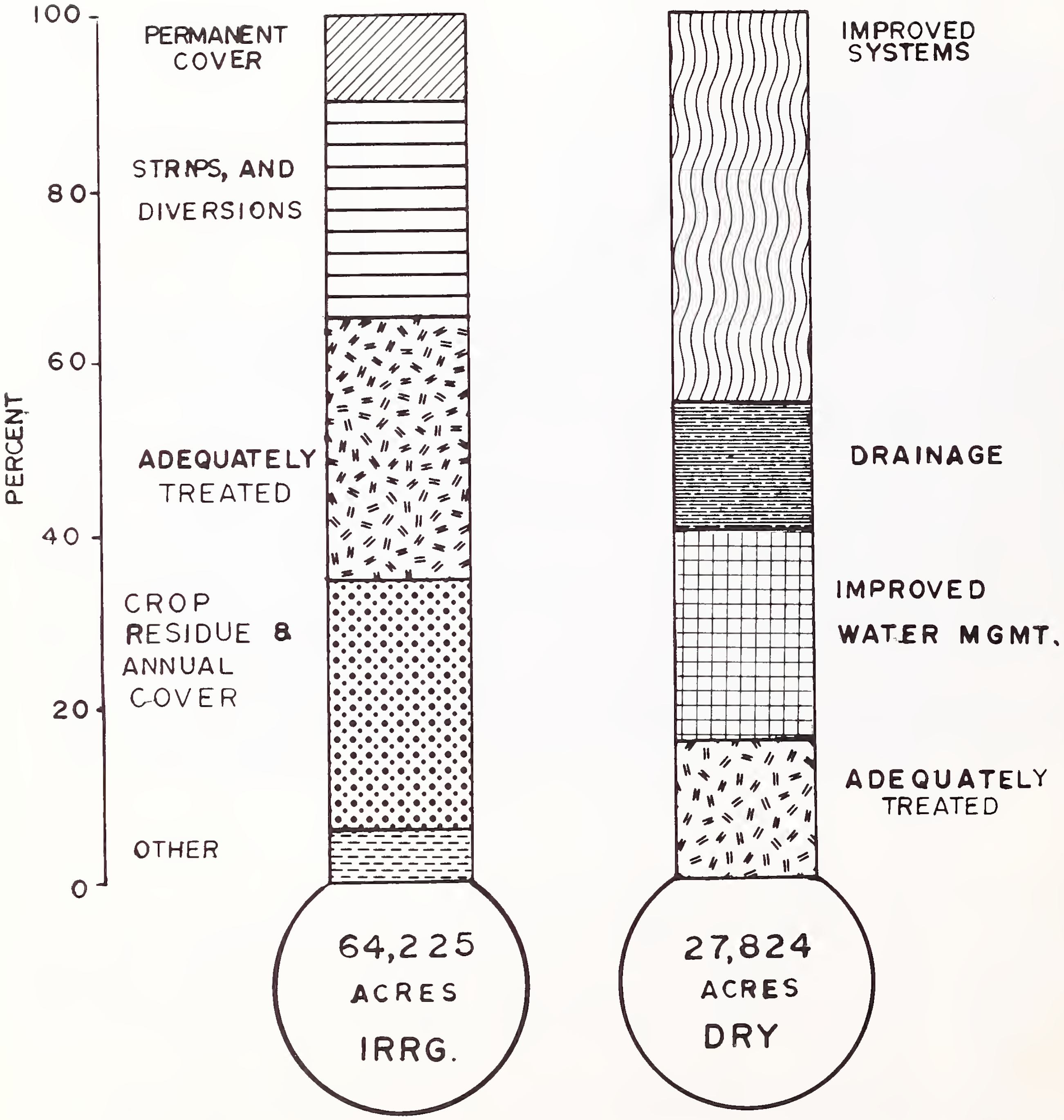
Land excluded as follows:

Federal Non-Crop	1,062,848 acres
Small Water Areas	1,361 acres
Urban Build-Up	20,730 acres

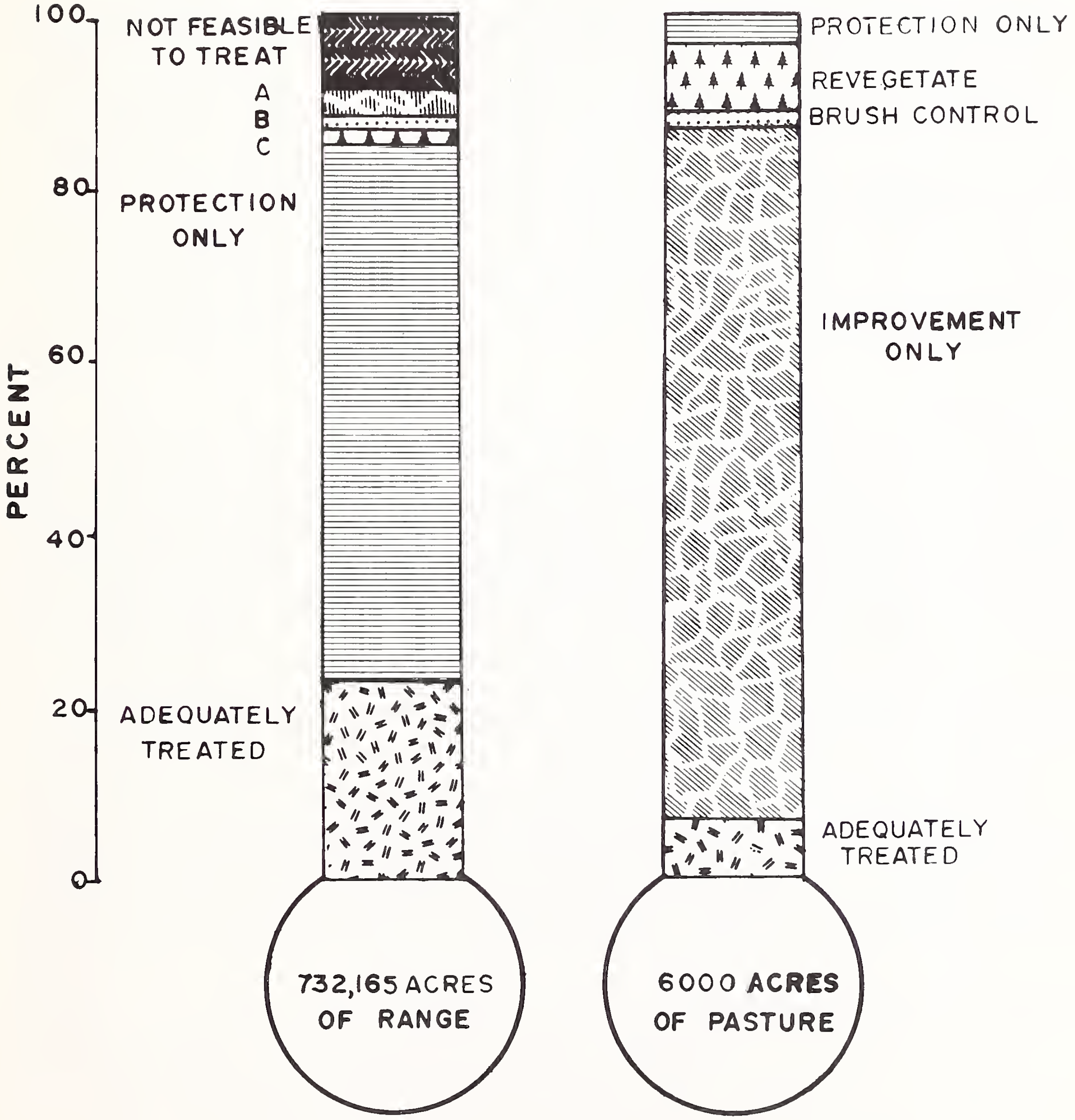
CONSERVATION NEEDS INVENTORY
CONSERVATION PROBLEMS BY LAND USE

Problem	Total	%	Cropland		Hayland		Hay and Past. in Rotation	Pasture		Range	Forest		Other
			Dry	Irrig	Dry	Irrig		Dry	Irrig		Comm	Non-Comm	
Erosion	587,610	51	7,755	7,497	4,216	2,275	5,976	5,343	6,094	361,550	168,634	17,592	678
Wetness	75,874	7	-0-	16,685	-0-	4,141	1,345	461	4,930	37,396	1,896	1,754	7,266
Soil	406,237	36	1,101	1,787	300	2,494	1,016	196	2,520	317,062	56,388	19,306	4,070
Climate	70,180	6	35,820	183	624	150	1,338	-0-	81	16,157	14,489	15	1,323
Total	1,133,301	100	44,676	19,549	5,140	9,060	9,675	6,000	13,625	732,165	241,407	38,667	13,337

CROPLAND
TREATMENT NEEDS



RANGE & PASTURE
TREATMENT NEEDS



A) IMPROVEMENT ONLY

B) BRUSH CONTROL

C) RE ESTABLISHMENT

GEOLOGY OF LEWIS AND CLARK COUNTY

Lewis and Clark County contains a varied and dramatic sampling of geologic features: minerals and hard-rock mines, glaciated mountains, thrust faults, remnants of ancient lakes and seas, and much more. Many of our cities and towns started as mining communities; the mines are now for the most part exhausted but our underground riches are not. Geothermal energy and natural gas promise both short and long-term energy supplies for the future, while new geophysical and geochemical exploration techniques may lead to deep-seated mineral resources.

How and why did these mineral and energy resources form? What is the origin of the spectacular scenery that enriches our lives and attracts visitors from all parts of the country? This chapter gives a geologic overview of our area and attempts answers to these questions.

The Belt Rocks

The central and western portions of the county are underlain by thick layers of sedimentary rocks which are collectively named the "Belt" by geologists. This name comes from the extensive outcrops of these rocks in the Big and Little Belt Mountains. The Belt sediments were laid down as mud, sand, and silt in a shallow sea and along a low shoreline approximately 1 billion years ago. These ancient sediments were compressed and hardened into sandstone, siltstone, and shale--solid rocks which today are best seen in the spectacular red and green cliffs along the gorge of Little Prickly Pear Creek between Sieben Ranch and Wolf Creek. Flat pieces of these rocks are adorned with ripple marks, mud cracks, raindrop imprints, and the square imprints of sea-salt crystals.

The Belt also has beds of limestone--the Helena Formation on the geologic map. Excellent exposures of fossil algae in this formation are seen on Rogers Pass and in large roadcuts west of Helena on U.S. Highway 12. The algae appear much like crinkly leaf lettuce and large heads of cabbage imbedded in the rock. Belt rocks have no other fossils because higher life forms had not yet evolved.

Paleozoic and Mesozoic Seas

Younger Paleozoic and Mesozoic sedimentary rocks cover the Belt rocks in much of our area. They, like the Belt rocks, accumulated in shaling seas and along swampy, flat coastal plains, roughly 600 to 60 million years in the past.

The Madison Limestone is perhaps the most prominent Paleozoic formation. It forms the towering white cliffs along the Missouri River in the Gates of the Mountains. Some layers in the Madison are tipped up vertically at right angles to their originally horizontal position; other layers are bent into large folds. This deformation happened during the early stages of building the Rocky Mountains, as described below more fully.

The Flathead Sandstone is another easily recognized formation. The Flathead is the oldest of the Paleozoic formations; it generally is seen as a band of rust-brown or yellowish-brown cliffs.

Mesozoic formations are generally not so distinctive as the Paleozoic ones. The Mesozoic is mostly shale (hardened mud) and thin sandstone beds. These rocks disintegrate readily into sand and mud when exposed to rain and wind and thus wear away into lowlands or rolling hills. Paleozoic sandstones and limestones are hard rocks and stand up as sharp ridges and cliffs that are easily visible.

With a detailed geologic map in hand none of the Paleozoic, Mesozoic, or other formations is difficult to recognize in the field. With a little practice the identifying characteristics of each become as familiar as a friend's face.

Formation of the Rocky Mountains

Approximately 100 million years ago, during the latter part of the Mesozoic era, the land to the west of here began to be slowly lifted up and stretched. Rocks deep in the earth's crust were heated and became molten, forming magma as hot as 600° to 900° C. The magma rose upward in the crust and bulged the surface upward: the area now known as Lewis and Clark County lay on the east slope of this uplifted area. Along a zone from the Lincoln-Scapegoat country southeast to the Big Belt Mountains, the Belt, Mesozoic, and early Mesozoic rocks slid (or were pushed) eastward many miles.

Geologists are not sure how much pushing versus sliding actually happened. In early studies of this region, they assumed that a forceful pushing--a thrusting--was involved. Thus, they mapped a "thrust belt" diagonally through this area, wherein the rocks were moved eastward in a series of gigantic slices, each tens of miles long and hundreds or thousands of feet thick. Each slice overrode the next, with the entire thrusted mass moving tens of miles eastward onto the very youngest Mesozoic sediments. Many geologists now think that sliding, lubricated by water under pressure along the slip surface, can explain the eastward movement of rocks in the thrust belt. In any event, Lewis and Clark County has inherited a fantastically complex set of deformed, faulted, even crushed rocks, injected locally with magma and minerals, uplifted and faulted again, and, finally, eroded through millions of years to its present rugged landscape.

Mountain-building did not cease at the end of the Mesozoic some 60 million years ago, but rather continued intermittently throughout the following geologic era, the Cenozoic. Indeed, the major earthquakes that shook the Helena Valley in 1935, and the numerous smaller shocks before and after, testify that mountain-building remains active to this day. We can confidently predict still more strong quakes in this region, but nothing can be said about timing, location, or intensity of the events: the science of earthquake prediction is in its infancy.

Coupled with mountain-building, the latter part of the Mesozoic and much of the Cenozoic were times of extensive volcanic eruptions. Seventy-million-year-old volcanic flows and dikes (where molten magma filled cracks in the sedimentary rocks and hardened) are particularly well displayed between and north of Wolf Creek and Cascade.

During the Cenozoic, the main valleys in the area filled with sand, mud, and gravel, washed into the low areas by streams. The climate during much of this time was extremely dry--much of the area was a desert, and streams were not able to remove the sediments. Therefore, thousands of feet of sediments accumulated; they are exposed in many roadcuts in the Helena Valley and along the shores of Canyon Ferry Reservoir, especially near Canyon Ferry.

Mineral Deposits and the Boulder Batholith

South and west of Unionville, and extending south to Butte, is the Boulder Batholith. This is a great mass of granite and related igneous rocks, which formed from cooled and hardened magma about 70-75 million years ago. This magma intruded overlying rocks during the formation of the Rocky Mountains, as described above. As the batholith was emplaced, hot mineralized water worked out from the cooling magma and into cracks and holes in the surrounding and overlying "country rock." These hot solutions deposited not only white "bull quartz" of no economic value, but also a wealth of valuable minerals containing precious or base metals --gold, silver, copper, lead.

Rich mineral deposits are found also near a number of smaller batholiths and even smaller stocks, that were intruded more-or-less at the same time as the Boulder Batholith.

Mineralization concentrated about the edges of the stocks and batholiths and in limey rocks such as limestone and dolomite. The Helena placer gold, for instance, was washed down into Last Chance Gulch by streams running across ore veins in the limey rocks of the contact zone of the Boulder Batholith, several miles to the south.

Most of the obvious mineral deposits are mined out; however, sophisticated exploration techniques may well locate deep, concealed deposits of considerable size. The Lincoln area, for example, contains at least one major copper deposit which is not being mined because of environmental concerns.

Natural Gas Potential

The thrust belt, as described above, is made of many faulted slices of sedimentary rocks stacked like tilted dominoes, one overlapping the next. Natural gas in great volume is thought to be trapped in porous limestone and sandstone beds within some of the thrust slices. Major petroleum companies have started intensive geological and geophysical exploration ventures to locate these gas deposits. The prime areas are in part in remote areas--the rugged peaks north and east of Lincoln, and the Big Belt Mountains. Land-use conflicts are inevitable: can the gas, if it is found, be extracted without seriously degrading wilderness, wildlife, or scenic values?

Geothermal Resources

Lewis and Clark County has but a single hot spring--Broadwater, located on the west outskirts of Helena. In the early '70s, a geologist from the Southeast measured temperatures in the bottoms of numerous wells, and by this means found a hotter-than-normal area of about 1 by 3 miles high in the mountains northwest of Marysville. Deep drilling in the hot spot failed to find high enough temperatures for electric power production. However, temperatures in excess of 100° C and abundant hot water were encountered at a depth of about 2,500 feet.

There is a very real prospect that more exploration and drilling will locate shallower but still hot, geothermal water, heated by upward circulation from very hot rock or magma at depth. These geothermal sources could heat greenhouses and a variety of agribusinesses, as well as homes and office buildings. Strictly speaking, geothermal energy is not completely renewable (unless used in small quantities). Nonetheless, its use could be extended over a very long time, perhaps hundreds or thousands of years, and thus provide an important replacement for petroleum imports and our very finite reserves of natural gas.

Fossils

Paleozoic and Mesozoic rocks are usually rich hunting grounds for fossils in the county. A careful search of Paleozoic formations will often uncover horn corals (which indeed look like small, tapered cow's horns); honeycomb (tabulate) corals; shellfish such as clams, snails, and brachiopods; pieces of crinoids (thick discs with a central hole; Indians strung them as beads); and trilobites (much like crabs, but unrelated).

Some Mesozoic rocks in the county contain an abundance of fossil clam and snail shells, and an occasional fragment of a fish (often a shark's tooth) or a dinosaur bone. In and near thin coal beds, the rocks may be carefully split open along the bedding to find plant fossils such as a delicate leaf or a woody stem.

Cenozoic rocks are locally highly fossiliferous. Plant fossils, including petrified wood, and scattered mineralized teeth and bones of mammals such as camels, primitive horses, small rodents, and others, are found in many of the sedimentary deposits in the Helena Valley and around Canyon Ferry Reservoir. Bone fragments and teeth are, however, small and much like little pebbles or bits of modern wood--it takes a sharp eye to spot them.

Rock Hounding

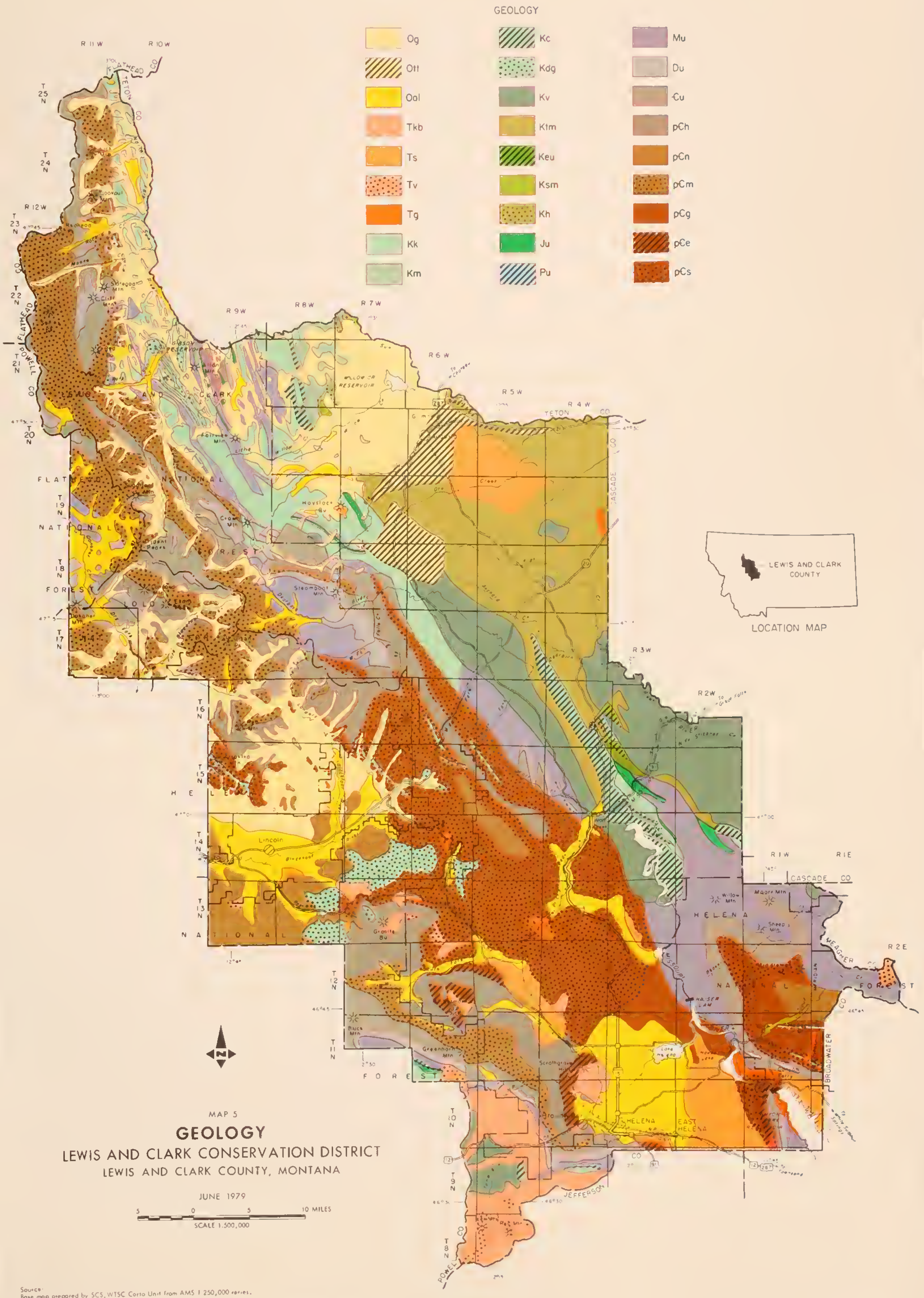
The county offers abundant opportunity for collecting minerals and rocks from abandoned mine dumps, outcrops, and placer gravels. The El Dorado Bar, a placer deposit on the Missouri River, contains gem-quality sapphires which were for the most part eroded from an igneous dike now buried below water level. Many collecting localities are on private land and permission should be obtained before entering. Also, abandoned mines may be dangerously unstable.

The Ice Ages

Near the end of the Cenozoic the climate grew cooler and wetter, and the ice ages, or Pleistocene, ensued. Most of the high mountains in the county were heavily glaciated. The largest alpine glaciers were in the Bob Marshall and Lincoln-Scapegoat country. There small alpine glaciers filled every high valley; they then flowed slowly down to merge in the main trunk drainages, there to form great streams of ice tens of miles long. Ice spilled out onto the high plains from the Sun River Valley, making a broad fan-shaped "piedmont" glacier (literally--a "foot-of-the-mountain" glacier) some tens of miles wide, extending nearly to Augusta. Likewise, the Lincoln Valley filled with glacial ice.

The glaciers scoured out the bedrock, leaving U-shaped valleys, serrated ridges, hanging cirques at valley heads, gouged-out lake basins, and Matterhorn-like peaks. The Garden Wall, at the extreme northwest corner of the county, is a classic illustration of the power of glacial erosion. In the lowlands, the piedmont and valley glaciers melted away about 10,000 years ago, leaving a chaotic landscape of low hummocks, sinuous moraine ridges, and hundreds of kettles, bowl-shaped depressions where blocks of ice melted. The kettles in many places are filled with water; good examples dot the area west of Augusta, at the foot of the Sawtooth Range, and provide shelter for thousands of waterfowl.

During the ice ages an immense continental ice sheet, thousands of feet thick, crept into northern Montana from the Canadian interior. The glacier at its maximum extended approximately to the present course of the Missouri River, and blocked this river where it leaves the mountains southwest of Great Falls. Water backed up above this gigantic ice dam, making a large lake, which has been named Glacial Lake Great Falls. Today, a close look reveals cream-colored clay and silt deposits which settled out onto the floor of the glacial lake, and faint terraces which mark the former shorelines of the lake. At its maximum, the lake occupied the lower part of the Helena Valley.



MAP 5

GEOLOGY

LEWIS AND CLARK CONSERVATION DISTRICT
LEWIS AND CLARK COUNTY, MONTANA

JUNE 1979

Source:
Base map prepared by SCS, WTSC Carto Unit from AMS 1:250,000 series.
Thematic detail compiled by state staff.

U S DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

LEGEND
Geology Map

TKb	BOULDER BATHOLITH AND BROADLY RELATED STOCKS - Mainly quartz monzonite, but includes diorite, aplite, and other rocks. The distinctions between rock masses relative to the Boulder batholith and those mapped as of other ages are locally arbitrary and tentative.
TV	TERTIARY VOLCANIC ROCKS - Flows and associated pyroclastic deposits, with subordinate amounts of intercalated sedimentary beds and lignite. The volcanic material is mostly latite, quartz latite, and andesite but includes some rhyolite and basalt. The distinction between Tertiary and pre-Tertiary volcanic rocks was not made in some of the reports used in the compilation. Hence in the less well-known areas some pre-Tertiary volcanic rocks may be included.
KC	COLORADO SHALE - Dark-gray shale and siltstone with many concretions and sandy units. Includes equivalents of Fall River, Skull Creek, Newcastle, Mowry, Belle Fourche, Greenhorn, Carlile, and Niobrara formations, and locally Telegraph Creek formation. In the less well-known areas beds of other ages may have been included.
KV	CRETACEOUS VOLCANIC ROCKS - Flows and pyroclastic rocks, mainly of intermediate composition with subordinate amounts of interbedded sedimentary rocks. Some of the rocks have been regarded as belonging to the Livingston formation but this usage is not adopted here. Where data is inadequate for separation, some Tertiary volcanic rocks may be mapped with the Cretaceous volcanic rocks.
KK	KOOTENAI FORMATION AND ASSOCIATED ROCKS - Conglomerate, sandstone, shale, and mudstone; purplish and green beds are common; mainly the Kootenai; in southern Montana includes strata that have been mapped as Cloverly formation. Includes Second Cat Creek and Third Cat Creek sands of drillers in central part of State; Sunburst sand of drillers in north-central part; and Cut Bank sand of drillers in western part. As here mapped, may locally include thin units of Jurassic age.
Mu	MISSISSIPPIAN, UNDIFFERENTIATED - Sandstone, shale, and limestone, in part dolomitic, with chert nodules, some quartzite; includes Big Snowy group in central part of State; Madison group in central and southwestern parts; and Hannan and Brazer limestones in the northwestern part; may include small amounts of Pennsylvanian rocks in areas where stratigraphic studies are incomplete.

DU	DEVONIAN, UNDIFFERENTIATED - Comprises Three Forks formation consisting of carbonaceous and calcareous shale with some sandstone and limestone, Jefferson limestone, and unnamed units of Devonian age.
EU	CAMBRIAN, UNDIFFERENTIATED - Comprises Deadwood formation, in south-central Montana, and Red Lion formation, Dry Creek shale, Hasmark formation, Pilgrim limestone, Silver Hill formation, Park shale, Meagher limestone, Woolsey shale, Flathead quartzite, and other units. In a few places quartzite of Cambrian age may be mapped with the Belt series or quartzite of Belt age with the Cambrian rocks.
PEM	MISSOULA GROUP - Chiefly red, maroon, or purple argillite; sandy or quartzitic argillite, and generally impure quartzite and limestone. The larger limestone masses are similar to the Siyeh limestone of the Piegan group. The Missoula group includes numerous named formations, most of which cannot be traced with confidence far from their type localities, Among these are the Marsh shale in the Helena region, the Striped Peak and Libby formations in northwestern Montana, five near Missoula, and others in and south of Glacier National Park.
PES	SPOKANE SHALE - Red or red-purple shale with numerous green beds locally and some quartzite; grades into the Empire above and the Greyson below and in some areas as mapped probably includes all or part of Empire and Greyson shales. The name has been used over a wide area in Montana but in a strict sense can be used safely only in the general vicinity of Helena.
TS	TERTIARY SEDIMENTARY ROCKS, UNDIFFERENTIATED - Clastic deposits in western Montana, mostly in valleys, and in most places not divided into formations; mostly poorly consolidated gravel, sand, silt, and clay; includes some tuffaceous material and locally lenses of lignite and bentonite; a little hot spring tufa; and in areas not yet mapped in detail, lava may be included. These rocks were in part laid down in lakes but a large part was formed in streams and alluvial fans. These rocks are Tertiary in age and as now mapped may even include some beds of Cretaceous age. Some late Tertiary terrace deposits may be included.
PEH	HELENA LIMESTONE - Gray, unevenly laminated limestone, argillaceous and dolomitic; weathers light brown or yellow. Segregation structures and stromatolites are common. Distinguished only in general vicinity of Helena.
PEG	GREYSON SHALE - Dark-gray to dark-brown argillaceous and sandy rock; weathers brown or red; grades into the Spokane and the Newland. Distinguished only in the general vicinity of Helena.

PEE	EMPIRE SHALE - Green dense, laminated shale with some red beds. Distinguished only in the general vicinity of Helena.
PEN	NEWLAND LIMESTONE - Dark bluish-gray argillaceous, dolomitic limestone with some argillite, locally schistose; segregation structures not conspicuous. In central and western Montana the Newland and Wallace formations have been treated as essentially synonymous terms by some authors.
TG	TERTIARY COARSE-GRAINED INTRUSIVE ROCKS - Some of these rocks have the composition of quartz diorite, monzonite, and similar rocks but most are alkalic syenite, leucite-rich rocks, and other alkalic varieties. Some of the rocks that are associated with the Cretaceous volcanic rocks may be Cretaceous in age. Includes the larger intrusive masses in the eastern part of western Montana and the western part of eastern Montana, most of which have domed upper surfaces. Many of these masses have been regarded as laccoliths, but generally without adequate proof. The Boulder batholith and related stocks are mapped separately.
KTM	TWO MEDICINE FORMATION - Greenish-gray clay with local nodular limestone and crossbedded sandstone; locally some coal in lower part. Rocks equivalent to Judith River formation, Claggett formation, and upper part of Eagel sandstone are included in this unit.
Ju	JURASSIC, UNDIFFERENTIATED - Clacareous shale and sandstone; includes the Morrison formation, the Ellis group, Sundance formation and other rocks of Jurassic age.
QTT	TERRACE DEPOSITS - Gravel, sand, and silt of terrace remnants.
QAL	ALLUVIUM - Mainly valley fill consisting of silt, sand, and gravel; includes some terrace deposits and glacial drift of Pleistocene age in some areas; locally includes hot spring tufa. The older part of the alluvium, where present, is probably of Pliocene age.
Pu	PERMIAN, UNDIFFERENTIATED - Chert, sandstone, limestone, quartzite and shale with rock phosphate mostly at base; mainly Phosphoria formation.
KDG	DIORITE AND GABBRO - Dark, moderately fine grained rocks in sills, dikes, and irregular bodies; not readily distinguished from similar rocks of other ages. Hence in the less well-known areas errors in age assignment may remain. These rocks are assigned to the Cretaceous.

QG	GLACIAL DRIFT - Morainal and outwash plain deposits of mountain glaciers; mainly ill-sorted and poorly rounded boulders, cobbles, pebbles, and sand; may include alluvium in places.
KM	MONTANA GROUP, UNDIFFERENTIATED- Mainly sandstone and shale, soft and in part poorly consolidated; some coal; shown undivided only in areas where detailed data are lacking and in these areas some rocks not of Montana age may have been included. In particular, rocks designated Km in southwestern Montana may include some Tertiary strata.
KSM	ST. MARY RIVER FORMATION - Greenish-gray with local nodular limestone and cross bedded sandstone.

This landmark is the gateway to an area rich in geologic formations.

MINERALS IN LEWIS & CLARK COUNTY

The early development and economy of Lewis and Clark County, and in particular, the Helena area, was guided by the discovery and exploitation of mineral resources.

Although placer gold was first discovered in 1862 in Prickley Pear and Silver Creeks, the county's mining history blossomed with the discovery of placer gold in Last Chance Gulch on July 14, 1864. By the fall of 1864, the Whitlatch-Union lode mine, also in Last Chance Gulch, had been discovered and was in operation. The trend of discovering placer gold which led to the location of lode sources continued, and soon, most of the major placer and lode deposits were being mined. As the placer deposits depleted, emphasis shifted to the mining of gold and silver ore. Low-grade placer deposits were passed by for lack of the technology to mine them.

Production from the lode mines was limited by the ability to process the ore. Stamp mills were installed to process the free-milling ores but the more complex ores required smelting to liberate the minerals. Initially, the smelters were located in Swansea, Wales and ore had to be shipped by freight wagon to either the ferries at Fort Benton or the railroad at Corinne, Utah. Either way was expensive and only the richest ores could be mined and shipped at a profit. The Northern Pacific Railroad reached Helena in 1883. The lower freight rates provided by the railroad kindled interest in exploitation of the ores which required smelting. The installation of concentrators at the minesites, and the opening of the East Helena smelter in 1889 made possible the operation of mines which formerly may have been uneconomical.

By 1900, the mining districts were well established and some of them were already on the decline. The Montana Bureau of Mines and Geology lists the mining districts of Lewis and Clark County as follows:

Austin
Blue Cloud
Gould-Stemple
Heddleston
Helena
Lincoln
Marysville
Missouri River
Ophir
Rimini
Scratchgravel Hills
Wolf Creek
York

Following is a brief description of a few of the more well known mines and districts of the county.

The Jay-Gould lode in the Gould-Stemple district was discovered in 1884 and operated occasionally until the 1930's. As of 1915, $2,500,000 in gold and silver was removed from the property. The mine then changed hands several times and production records are not clear.

The Mike Horse mine, the primary producer of the Heddleston District, was discovered in 1898. A small mill was located on the property in 1919 but was replaced by a 150 ton per day flotation mill in 1939. Between the time of discovery and the final shutdown in 1964, it is estimated that the mines of the Heddleston District produced $25,000,000 in gold, silver, lead, zinc, and copper.

In addition to the well known Last Chance Gulch and Whitlatch-Union strikes of 1864, several other placer and lode deposits were mined in the immediate Helena area. This includes the Dry Gulch placer mine and the Springhill and Park lodes. Stamp, cyanide, and flotation mills were constructed to either extract the minerals or concentrate the ore prior to shipment to a smelter. A floating bucket-line dredge commenced operations directly north of the city of Helena in the 1930's. Before it shut down, it recovered gold from 600 acres of the valley.

Mining in the Marysville district commenced with the discovery of placer gold at Silver Creek in 1862. Fourteen years later, Thomas Cruse located the Drumlummon lode; the source of some of Silver Creek's placer gold. Cruse installed a five stamp mill and operated the mine at a profit until he sold it in 1883. The Montana Company purchased the property from Cruse, developed the mine, and installed a fifty stamp mill. The mine had produced $9,200,000 in gold and silver by 1891 and $16,000,000 by 1933. Including the production of other area mines, the district had produced $31,000,000 by 1933.

In contrast to the late 1800's and early 1900's, local mining presently has little effect on the economy of Lewis and Clark County. The historical producers are, at this time, basically inactive. There are several small producing gold and sapphire placers which are located in areas of historical production. For people who are interested in finding their own sapphires, it is possible to visit one of several privately owned placer deposits adjacent to the Missouri River.

The various mining districts still undergo considerable prospecting and exploration by both individuals and corporations. Recently, the Helena Valley has been prospected for uranium by drill exploration.

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WATER RESOURCES

The Continental Divide crossing the western part of Lewis and Clark County separates the county into two major river basins, the Missouri and the Columbia.

The east slope of the Continental Divide in Lewis and Clark County drains into the Missouri River by means of four minor stream basins: Prickly Pear Creek on the south; Little Prickly Pear in the south central; the Dearborn River in the north central; and the Sun River along the northern boundary. That portion of Lewis and Clark County in the Columbia River Basin drains into the Blackfoot River and its tributaries, which joins the Clark Fork at Bonner, in Missoula County.

Tributary streams of irrigation importance in Lewis and Clark County that drain into the Columbia River are: the Blackfoot River, Poor Man's, Keep Cool, Beaver, and Willow Creeks.

The U.S. Geological Survey carries on the work of measuring stream flows, cooperating with funds supplied by the state and several federal agencies. The results are published yearly in book form. Later data may be obtained in advance form from the U.S.G.S. office. That agency's records and reports have been used in the preparation of this resume.

Data given below covers all of the stream gauging which has been done in Lewis and Clark County from the beginning of measurements through the water year. The water year begins October 1 and ends September 30 of the following year.

For the convenience of the layman, the gauging stations have been grouped by drainage basins rather than taking them in order, beginning with headwaters and progressing downstream as was done in the U.S.G.S. published reports.

Following are equivalents useful in converting from one unit of measurement to another.

(a) In Montana, one cubic foot per second equals 40 miner's inches.
(b) One acre foot is the amount of water required to cover an acre one foot deep.
(c) One cubic foot per second will nearly equal two acre feet (1.983 in 24 hours).
(d) A flow of 100 miner's inches will equal five acre feet in 24 hours.
(e) One miner's inch flowing continuously for 30 days will cover one acre 1 1/2 feet deep.

MISSOURI RIVER, MAIN STEM

Missouri River at Canyon Ferry

The gauge is located at old Canyon Ferry Dam 1/2-mile downstream from Magpie Creek. The drainage area is approximately 15,700 square miles. Records are available for only three months, September through November 1889. The gauge was manually operated. The maximum discharge observed was 2,834 cfs (November 21) and the minimum observed 1,693 cfs (September 1).

Missouri River below Hauser Dam

The gauge was located 1/4-mile below Hauser Lake Power Plant. The drainage area is approximately 16,600 square miles. Records are available from October 1922, through September 1942. A water stage recorder was used. The average discharge for the 20 years was 4,115 cfs. The maximum daily discharge was 33,300 cfs (June 15 and 18, 1927), and the minimum daily, 280 cfs (March 3, 1938). The highest annual runoff was 4,652,000 acre feet (1928); the lowest was 1,723,000 (1934); and the average, 2,979,000 acre feet per year.

Missouri River below Holter Dam

The gauge is located 1/4-mile below Holter Dam and 3 miles southeast of Wolf Creek. The drainage area is approximately 16,900 square miles. Records are available from October 1945, to the present time. A water stage recorder is used. The average discharge for the 11 years (1945-56) was 5,212 cfs. The maximum was 34,800 cfs (June 8, 1948) and the minimum daily, 830 cfs (May 22, 1955). The highest annual runoff was 5,653,000 acre feet (1948), the lowest was 2,262,000 (1954); and the average, 3,773,000 acre feet per year.

Missouri River at Craig

The gauge was located on the highway bridge at Craig. The drainage area is approximately 17,600 square miles. Records are available from October 1889, through September 1892. A staff gauge was used. The maximum discharge observed was 28,650 cfs (June 11, 1892) and the minimum observed, 1,742 cfs (at times during October and December 1890, and January 1891).

PRICKLY PEAR CREEK BASIN

Prickly Pear Creek at East Helena

The gauge was located at the Northern Pacific Railroad bridge. The drainage area is 254 square miles. Records are available from July 1908, through September 1913. A staff gauge was used. The average discharge for the 5 years was 67.5 cfs. The maximum observed was 535 cfs (June 19,

1909) and a minimum was not determined. The highest annual runoff was 72,000 acre feet (1909); the lowest, 40,000 acre feet (1912); and the average, 48,870 acre feet per year.

Ten Mile Creek near Rimini

The gauge is located at Moose Creek Ranger Station 500 feet upstream from Moose Creek and 3 miles north of Rimini. The drainage area is approximately 33 square miles. Records are available from October 1914, to the present time. A water stage recorder and a Cippoletti weir are used. The average discharge for the 42 years (1914-56) was 18.4 cfs and the maximum, 781 cfs (May 27, 1917). The flow is regulated by Chessman Reservoir (capacity 1,750 acre feet) on a tributary above the gauge. The highest annual runoff was 38,500 acre feet (1917); the lowest was 2,610 acre feet (1931); and the average, 13,320 acre feet per year.

Ten Mile Creek near Helena

The gauge was located opposite the old Broadwater Hotel. The drainage area is 102 square miles. Records are available from July 1908, through September 1954. Prior to September 18, 1925, a staff gauge was used, and to March 15, 1929, a water stage recorder at a site 100 feet downstream at a different datum. The later readings were made with a water stage recorder and concrete control. The average discharge for the 46 years (1908-54) was 27.2 cfs. The maximum was 995 cfs (May 28, 1917). The highest yearly flow was 53,300 acre feet (1927) and the lowest, 3,180 (1931), with an average of 19,690 acre feet per year.

Seven Mile Creek at Birdseye

The gauge is located at a private farm bridge at Birdseye 5 1/2 miles upstream from the mouth and 7 miles northwest of Helena. The drainage area is approximately 32 square miles. Records are available from October 1908, through September 1913. A staff gauge was used. Average discharge for the 5 years (1908-13) was 7.60 cfs. The maximum was 76 cfs (June 9, 1909) and the minimum daily, 0.1 cfs (July 30, August 5-10, 1910). The highest annual runoff was 7,770 acre feet (1909); the lowest was 3,140 (1911); and the average, 5,500 acre feet per year.

Little Prickly Pear Creek near Marysville

The gauge was located 1/2 mile below Deadman Creek and 6 miles northwest of Marysville. The drainage area is approximately 44 square miles. Records are available from April 1913, through December 1932. The maximum discharge observed was 454 cfs (May 25, 26, 1917) and the minimum observed, 2 cfs (March 1-11, 1914). The average discharge for the 19 years (1913-32) was 25.7 cfs. The highest yearly flow was 36,600 acre feet (1917); the lowest was 6,340 (1931), and the average was 18,610 acre feet per year.

Little Prickly Pear near Canyon Creek Post Office

The gauge was located 1/2 mile below Canyon Creek and 1 mile northeast of Canyon Creek Post Office. The drainage area is 183 square miles.

Records are available from April 1909, through December 1924. A staff gauge was used. The average discharge for 13 years (1909-11, 1913-24) was 48.2 cfs. The maximum flow observed was 665 cfs (May 29, 1913). At times there was no flow. The highest annual runoff was 69,900 feet (1917); the lowest was 9,090 (1919); and the average was 34,900 acre feet per year.

Canyon Creek near Canyon Creek Post Office

The gauge was located on the Van Cleve ranch 300 feet above Cottonwood Creek and 3 miles northwest of Canyon Creek Post Office. Records are available from May 1921, through July 1923. A wire weight gauge was used. The drainage area is approximately 74 square miles. The maximum discharge observed was 268 cfs (May 20, 1922) and the minimum observed, 5.6 cfs (March 27, 1922).

DEARBORN RIVER BASIN

Dearborn River above Falls Creek

The gauge was located 1/2 mile above Falls Creek. The drainage area is 69.6 square miles. Records are available from May 1908 through December 1911. A staff gauge was used. The maximum discharge was estimated to be about 4,000 cfs (June 2, 1908) and the minimum observed was 13.7 cfs (January 17, 1911).

Dearborn River near highway bridge

The gauge was located 300 feet above the Highway 434 bridge. The drainage area is 123 square miles. Records are available from April 1921, through September 1923 and May 1929 through September 1953. A wire weight gauge was used prior to April 8, 1931, and then a water stage recorder thereafter. The average discharge for the 26 years of record was 116 cfs. The maximum observed was 2,970 cfs (June 4, 1948) and the minimum, 7.4 cfs (October 22 and 23, 1936). The highest annual runoff was 155,200 acre feet (1948); the lowest was 28,810 (1937); and the average, 83,980 acre feet per year.

Dearborn River near Craig

The gauge is located at a bridge on Highway 287, 5 miles below the South Fork and 12 miles above the mouth of the river. The drainage area is 325 square miles. Records are available from October 1945 up to the present time. A wire weight gauge was used prior to October 1, 1946, and a water stage recorder has been used since then. The maximum discharge was 7,960 cfs (June 4, 1953) and the minimum observed, 12 cfs (August 2, 1956). The mean discharge for the 11 years (1945-56) was 225 cfs. The highest yearly flow was 263,800 acre feet (1948), the lowest was 74,270 (1946); and the average, 162,900 acre feet per year.

SUN RIVER BASIN

North Fork of the North Fork of Sun River near Augusta

The gauge is located 400 feet above Medicine Creek and 1 mile above the confluence with the South Fork. The drainage area is 258 square miles. Records are available from May 1911 through September 1912, and from October 1945, up to the present time. A water stage recorder is now used. Prior to July 1946, a staff gauge and wire weight gauge were used. The maximum discharge was 4,840 cfs (June 3, 1948) and the minimum, 27 cfs (November 21, 1949). The mean annual flow for the 12 years (1911-12, 1945-56) was 369 cfs. Highest annual discharge was 324,000- acre feet (1954); lowest was 200,400 (1949), and the average was 267,100 acre feet per year.

South Fork of the North Fork of the Sun River near Augusta

The gauge was located 1 mile above the confluence with the North Fork and 24 miles northwest of Augusta. The drainage area is 252 square miles. A staff gauge was used. Records are available from May 1911 through September 1912. The maximum discharge observed was 2,740 cfs (June 3, 1911). The minimum was not determined.

North Fork of the Sun River at Augusta

The gauge was located about 150 feet above the Diversion Dam and 18 miles northwest of Augusta. Records are available from August 1889 through December 1890, and July 1904 through September 1940. The drainage area is 609 square miles. A water stage recorder was used after September 30, 1936. The maximum discharge was 32,300 cfs (June 21, 1916) and the minimum, 3.4 cfs (April 18, 1938). The mean discharge for the 37 years (1889-90, 1904-40) was 820 cfs. The highest yearly runoff was 1,173,000 acre feet (1916); the lowest was 272,000 (1931); and the average, 593,700 acre feet per year.

South Fork of the Sun River at Augusta (Elk Creek)

The gauge was located at the old highway bridge 1/2 mile from Augusta and 6 miles above the mouth of the river. A staff gauge was used. The drainage area is 157 square miles. Records are available from October 1904 through November 1924. The maximum discharge observed was 4,300 cfs (June 2, 1908); there was no flow at times. The average annual discharge for the 20 years (1904-24) was 94.4 cfs. The highest annual runoff was 154,000 acre feet (1917); the lowest was 14,800 (1919), and the average, 68,340 acre feet per year.

Willow Creek near Augusta

The gauge was located just below Little Willow Creek or 5 miles northwest of Augusta. The drainage area is approximately 96 square miles. Records are available from June 1905 through September 1925. Prior to August 22, 1905, a staff gauge was used and thereafter a chain gauge.

The maximum discharge was 1,150 cfs (June 23, 1916). The minimum was no flow (July 17, 1910). The average annual discharge (1905-25) was 27.7 cfs. Highest yearly flow was 56,200 acre feet (1916); the lowest was 5,190 (1919); and the average, 20,050 acre feet per year.

Smith Creek near Augusta

The gauge was located 5 miles above Ford Creek or 13 miles southwest of Augusta. The drainage area is 25.0 square miles. A staff gauge was used. Records are available from April 1906 through December 1912. The maximum discharge was 1,500 cfs (June 4, 1908) and the minimum observed, 6 cfs at times during 1906 and 1911. The mean annual discharge for the 6 years (1906-12) was 37.6 cfs. The highest annual runoff was 40,900 acre feet (1909); the lowest, 15,300 (1910); and the average 27,220 acre feet per year.

Smith Creek below Ford Creek near Augusta

The gauge is located 2 miles below Ford Creek or 4 miles above the mouth of Smith Creek. The drainage area is 74.0 square miles. A staff gauge was used prior to July 9, 1946, and a water stage recorder thereafter. Records are available from October 1945 through September 1952. The maximum discharge was 1,830 cfs (June 5, 1948) and the minimum daily, 12 cfs (December 19-21, 1945). Average annual discharge for the 7 years was 65.7 cfs. Maximum annual runoff was 81,370 acre feet (1948), and the minimum, 20,760 (1946). Average runoff was 47,560 acre feet per year.

Ford Creek near Augusta

The gauge was located on Ford Ranch 14 miles west of Augusta. The drainage area is 19.4 square miles. A staff gauge was used. Records are available from April 1906 through December 1912. The maximum discharge was 1,230 cfs (June 19, 1909), and there was no flow on November 2-3, 1906. Average annual discharge for 6 years (1906-12) was 32.2 cfs. The highest annual runoff was 35,800 acre feet (1909); the lowest was 15,700 (1910); and the average was 23,310 acre feet per year.

Lake Sewell

The old Canyon Ferry Dam, which created Lake Sewell, was built in 1898 and located 15 miles east of Helena. The reservoir had a usable capacity of 37,800 acre feet. The old dam was submerged by the new Canyon Ferry Dam on April 8, 1953.

Canyon Ferry Reservoir

A water stage recorder is located in the new powerhouse control room. The drainage area is approximately 15,860 square miles. Records are available from April 1953 through September 1956. Construction of the new Canyon Ferry Dam began in 1949 and was completed in 1953. Storage began in the new reservoir in March 1953. The old Canyon Ferry Dam was submerged on April 8, 1953. The maximum daily content during the period (1953-56) was 2,043,000 acre feet (July 15-29, 31, 1955 and July 2, 5, 6, 8, 1956). The total capacity of the reservoir at the controlled spillway elevation is 2,043,000 acre feet exclusive of 8,000 acre feet of dead storage. The minimum power operating elevation is 3,728 feet (reservoir contents 428,060 acre feet exclusive of dead storage).

Lake Helena

Lake Helena is separated from Hauser Lake by control works permitting independent regulation. It has a usable capacity of 10,400 acre feet. Records are available since April 1945, furnished by the Montana Power Company.

Hauser Lake

The Hauser Dam, 13 miles northeast of Helena, was completed in 1907. The reservoir has a usable capacity of 52,100 acre feet.

Holter Lake

The Holter Dam, 26 miles north of Helena, was completed in 1918. The reservoir has a usable capacity of 81,900 acre feet.

Gibson Reservoir

Gibson Reservoir is located on the Sun River 20 miles northwest of Augusta. The dam was completed in 1929. The reservoir has a usable capacity of 105,000 acre feet for irrigation (88,560 acre feet prior to 1941).

Pishkun Reservoir (off-stream storage)

Water is diverted from Sun River 18 miles northwest of Augusta into the Pishkun Reservoir which was completed in 1925 for irrigation. The usable capacity is 32,050 acre feet.

Willow Creek Reservoir on Willow Creek

This reservoir is located 5 miles northwest of Augusta. It was completed in 1911 and has a usable capacity of 32,300 acre feet for irrigation (16,700 acre feet prior to 1941). A supplemental supply to the reservoir is diverted from Sun River.

Nilan Reservoir (off-stream storage)

Water is diverted from Smith and Ford Creeks about 10 miles southwest of Augusta. The reservoir was completed in 1951 for irrigation with a usable capacity of 10,090 acre feet.

Irrigation water is basic to forage production and balanced ranch management.

Diversion and distribution structures provide efficient irrigation water to farms and ranches.

IRRIGATION

Helena Valley Unit

The Helena Valley Unit provides for the irrigation of approximately 15,600 acres of land. The pumping plant, consisting of two hydraulic turbine-driven centrifugal pumps, is situated about 500 feet downstream from Canyon Ferry Dam. The pumps are designed to pump 150 cfs per unit, at a total head of 145 feet. The maximum rpm of the unit is 325. Reservoir water is lifted to the Helena Valley Tunnel and flows by gravity through the Helena Valley Canal to the regulatory reservoir on the east side of the valley. From the 10,600 acre-foot capacity reservoir, the water flows into a canal which practically encircles the bowl-shaped valley. Municipal and industrial water are also provided to the City of Helena through the major diversion and storage works of the Helena Valley Unit. The Helena Valley Pumping Plant delivers water from Canyon Ferry Reservoir through the Helena Valley Tunnel and Canal, a distance of about 11 miles, to the Helena Valley Regulating Reservoir. Reservoir outlet works were installed for the city to take water delivery at that point. Under water service contract terms, the city pays for the delivery of a minimum of 600 acre feet per year, with provisions to pay for a maximum of 5,680 acre-feet per year.

Dearborn Canal Irrigation Project

History

The lands now served by the Dearborn Canal and Water Company were first included in a Carey Land Act Project in the year of 1905. At that time the Dearborn Project planned to store and divert the waters of the Dearborn River for the irrigation of 36,000 acres south of Gilman. After constructing 20 miles of ditch at a cost of $200,000 the project was dropped. On November 8, 1911, the contract with the Dearborn Canal Company was declared void and the land relinquished to the U.S. Government.

On the 29th day of May, 1913, the Dearborn Canal and Water Company was incorporated for a period of 40 years. This new canal company includes only a small part of the land area proposed for irrigation by the Dearborn Project of 1905-11. Among the first water users in the Dearborn Canal and Water Company were: S. W. Mosher, Jacob C. Fey, John Barrett, Levi La Chapelle, C. E. La Chapelle, Edmond La Chapelle, and W. J. Myles. Capital stock of the incorporation was set at $50,000, divided into 5,000 shares at a par value of $10.00 per share. The stock of the company was to be declared as non-assessable.

After expiration of their Articles of Incorporation May 28, 1953, the Dearborn Canal and Wager Company reincorporated for another 40 year period.

Present Statistics

Location: The Dearborn Canal diverts water from the North Fork of the Dearborn River in NE 1/4 SW 1/4 of Section 27, T. 18N., R. 7W., and follows a northeasterly direction for 4.1 miles where it spills into the headwaters of Flat Creek in SW 1/4NW 1/4 of Section 18, T. 18N., R. 6W. Using this drainage as a carrier for 1.8 miles it takes out again in the NW 1/4SW 1/4 of Section 8, T. 18N., R. 6W., and continues northerly 5.5 miles to NE 1/4SW 1/4 of Section 29, T. 19N., R. 6W. Water is also spilled into Flat Creek from the canal in NE 1/4SE 1/4 of Section 8, T. 18N., R. 6W., and taken out of Flat Creek. At the present time approximately 3,000 acre feet are being irrigated from this system.

Structures similar to this one on Flat Creek divert water to irrigate several thousand acres of hayland that supports the livestock industry within the District.

Nilan Water Users Association

History

This project is located in the northern part of Lewis and Clark County, seven miles west of the town of Augusta. It consists of a diversion canal from Smith and Ford Creeks diverting water to a bench reservoir, where two outlet (supply) canals furnish water for the irrigation of lands along Willow Creek, Smith Creek, and the South Fork of the Sun River.

The Nilan Storage Project was built by the State Water Conservation Board, which required the formation of the Nilan Water Users Association, and water purchase contracts between the water purchaser, the Association and the Board. (See Water Marketing and Water Purchase Contract, Page 43.)

Prior to awarding the construction contract in September 7, 1950, the Nilan Water Users Association filed articles of incorporation on June 20, 1950, for a period of forty years.

According to the Engineering Report of October 27, 1951, the Nilan Storage Reservoir will supply supplemental water to about 9,000 acres and a full supply to 1,000 acres under the project. The project first operated during the year 1952 under the Nilan Water Users Association.

Present Statistics

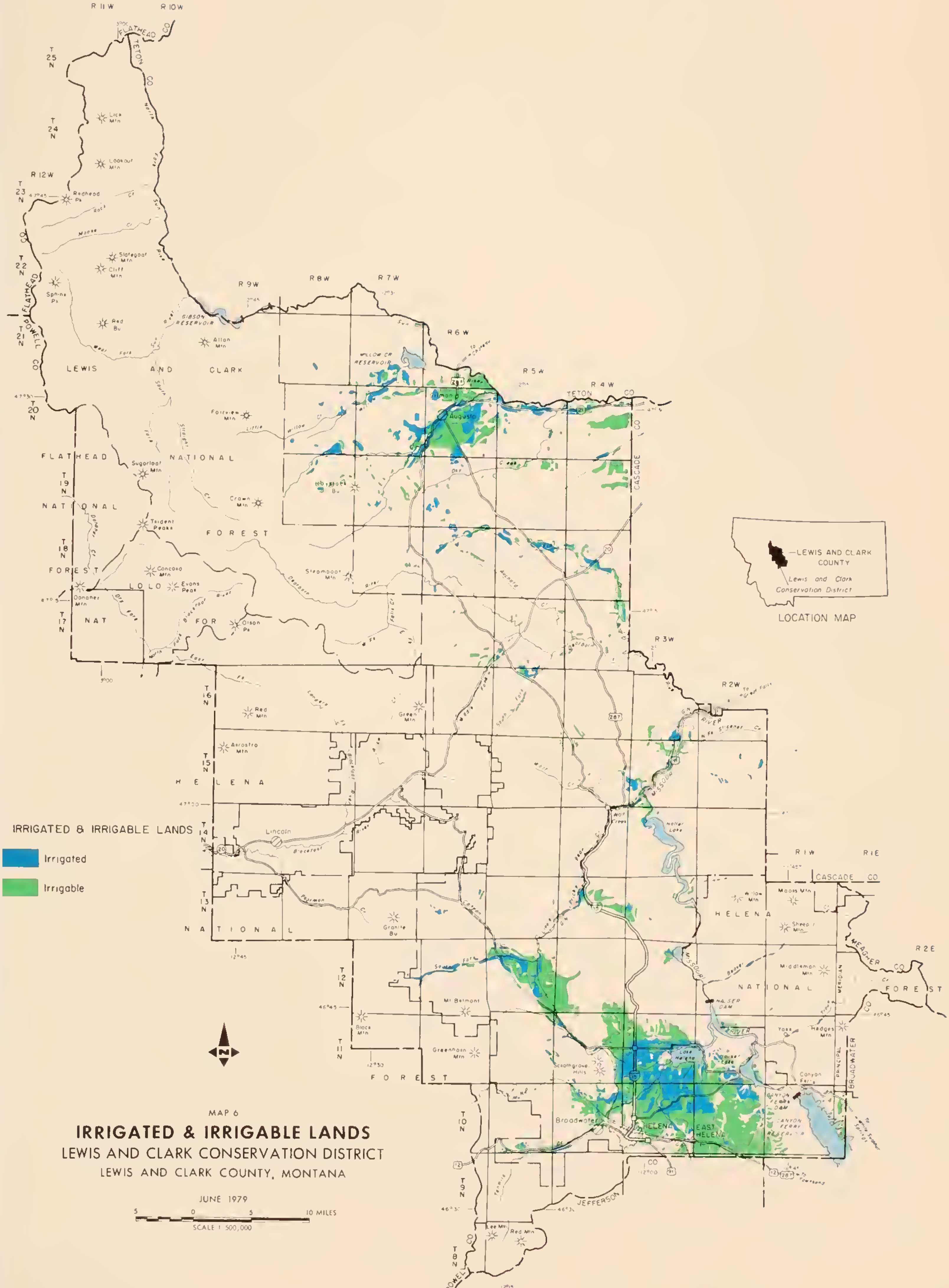
Location: The diversion canal diverts from the north bank of Smith Creek in Section 4, T. 19N., R. 8W., crossing Ford Creek in Section 26, T. 20N., R. 8W., where it empties into the Nilan Reservoir in Section 24, T. 20N., R. 8W. The reservoir occupies parts of Sections 17, 18, 19, and 20, T. 20N., R. 7W. and Section 24, T. 20N., R. 8W. From the reservoir the east supply canal diverts in Section 20, T. 20N., R. 7W., and courses southerly to where it empties into Smith Creek in Section 33, T. 20N., R. 7W. for irrigation of lands on both sides of the South Fork of the Sun River in the vicinity of Augusta. The north supply canal diverts from the reservoir in Section 18, T. 20N., R. 7W., and follows a northerly direction to its confluence with Willow Creek in Section 7, T. 20N., R. 7W., to serve lands along the south side of Willow Creek northwest of Augusta. Lands to be irrigated are located in parts of T. 20N. and T. 21N., R. 6W. and R. 7W.; T. 20N., R. 5W.; and T. 20N., R. 8W.

Besides furnishing water to private ditches out of Willow Creek, Smith Creek and the South Fork of the Sun River, the project also supplies water to the Florence Canal. Point of diversion for the Florence Canal is from Smith Creek in the SE 1/4 of Section 33, T. 20N., R. 7W. It has a capacity of 75 second feet and is approximately 15 miles long. During the summer of 1956 some reconstruction work on the Florence Canal was made and when the distribution systems for the individual water users are completed, about 4,000 acres will be irrigated from this canal.

The diversion canal from Smith Creek to Ford Creek has a capacity of 200 second feet and is 4.1 miles long. From Ford Creek the diversion canal has a capacity of 300 second feet and a length of 1.8 miles to the reservoir. At both Smith and Ford Creeks the diversion dams are built of concrete. The crest length on the Smith Creek diversion structure is 108 feet, with a height of 1.75 feet; on Ford Creek the diversion structure has a crest length of 63.3 feet and a height of 5.5 feet.

The total drainage area above the diversion canal is 44 square miles, with 26 square miles above the Smith Creek gauge and the remaining 18 square miles above the Ford Creek gauge.

Multiple use concepts improve the use of water for irrigation, wildlife and other uses.



MAP 6

IRRIGATED & IRRIGABLE LANDS

LEWIS AND CLARK CONSERVATION DISTRICT

LEWIS AND CLARK COUNTY, MONTANA

JUNE 1979

5 0 5 10 MILES
SCALE 1:500,000

Source
Base map prepared by SCS, WTSC Carto Unit from AMS 1:250,000 series.
Thematic detail compiled by state staff.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

M7-EN-24053-6

RANGE RESOURCE PROGRAM

The program is under the direction of a Range Leader, appointed by the Conservation District officials. Specific qualifications are needed by the individual to coordinate programs of various agencies into a program of implementation on the rangelands of the District. Other qualifications include a basic understanding of ranch operations and the many additional uses and responsibilities for which range is suited, the ability to communicate and to negotiate between ranchers and agencies, and a general desire to administer program leaderhsip under all circumstances. Examples of the duties of range leaders are:

1. To prepare assessments of the rangeland program in their areas, with the help of the local Committee for Rural Development or advisory committee of Conservation Districts Division, showing:
    a. Progress made to date on range improvements;
    b. Present projects being carried out; and
    c. Future development goals and objectives of the Rangeland Resource Program.
2. To make more effective use of existing service in planning, research, and education from existing agencies and institutions.
3. To assist ranchers, sportsmen, recreationists, and other users of rangeland to become more compatible.

The following is a listing of the 10-year goals of this plan:

1. Eighty percent of the native range will be operated under some form of intensive management planning;
2. Fifty percent of the native range will be in excellent condition, with 30 percent in good condition;
3. Native range and pasture will be producing 40 percent more usable forage;
4. Eighty percent of the native range will have stockwater fully developed, with stockwater being developed on the remaining 20 percent;
5. Recreational use will increase by 500 percent; and
6. The wildlife habitat on native range will be improved to support a more stable wildlife population.

Following are goals set by the Conservation District to achieve a sound Range Management program in the District.

Proper planning and use assures the landowner of abundant forage for producing livestock.

RANCH MANAGEMENT PLANNING

Situation

For a ranch to be economically sound, total unit ranch planning is necessary in developing range resource management plans. All animals need to be considered and a balanced forage resource program developed. The results include faster improvement of native rangeland, full utilization of arable land, and, ultimately, increased ranch income.

Ranchers find it pays to systematically inventory their ranch resources and then balance land use with grazing animal numbers to sustain natural resources.

Range improvements on private lands show that in recent years many ranchers have been doing a good job of developing and carrying out management plans.

State agencies such as the Montana Departments of State Lands and Fish and Game and federal agencies such as the U.S. Forest Service, Bureau of Land Management, Fish and Wildlife Service, and Bureau of Indian Affairs develop and carry out management plans on lands they administer in cooperation with their lessees or permittees.

Approach

Management plans will vary with each ranch unit since they are based on the needs of the individual ranch operation including:

1. Resource inventory of the entire unit;

2. Present method of operation;

3. Alternatives in the process of planning; and

4. Planned decisions of the operator or manager.

Technical assistance in resource planning is available to ranchers and state and federal agencies from the Extension Service, Soil Conservation Service, and private range consultants.

The Bureau of Land Management and the U.S. Forest Service are developing intensive management plans on their units. The Bureau of Land Management is preparing Allotment Management Plans on all allotments, and recent federal regulations are directed toward more careful management of all public lands.

It is essential that affected agencies and ranchers work closely together to achieve the goal of intensive management plans on rangeland.

Benefits

General--Accomplishment of this goal will result in the highest practical return in forage production for livestock or game animals, recreation values, and watershed protection. It will minimize erosion, watershed protection and pollution from sediment, increase aesthetic values, and help to stabilize the ranching economy as well as the rural community. Well prepared range management plans should also provide for development and the best possible use of rangelands to combat periods of drought, recognized as a normal, recurring part of Montana's weather cycle.

NATIVE RANGE CONDITION

Situation

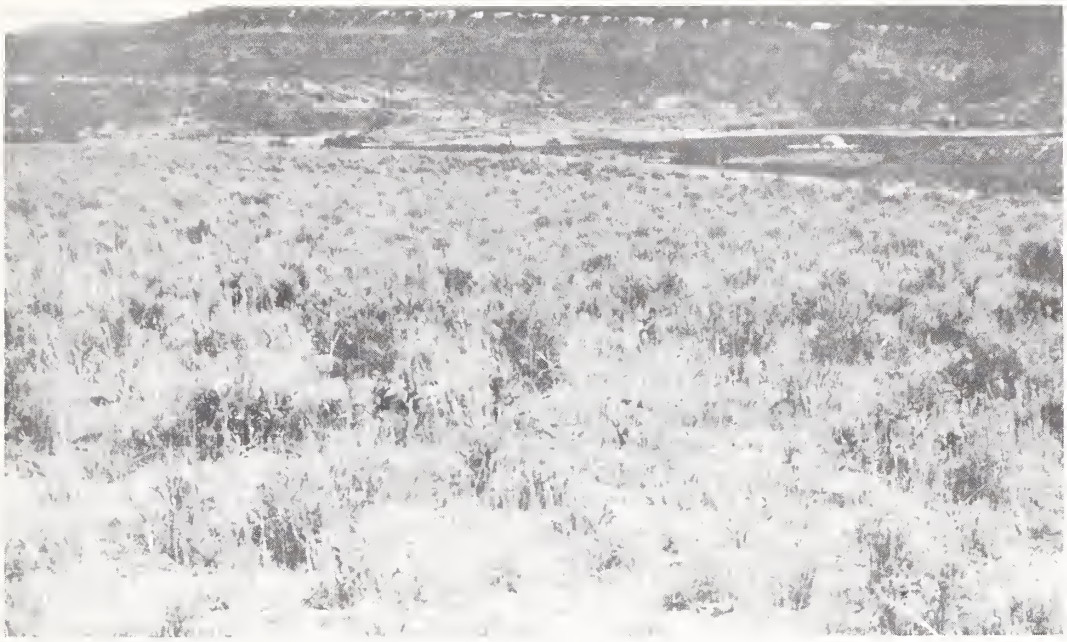
Range condition is defined as the present composition of vegetation in relation to the climax kind of vegetation for that particular site. Range condition should not be confused with degree of use. A range can be in excellent condition and still be closely utilized. However, if close or excessive use continues over an extended period of time, the dominant climax plants will decrease. Short grass and weedy type plants will then replace them, bringing about a lower range condition.

Approach

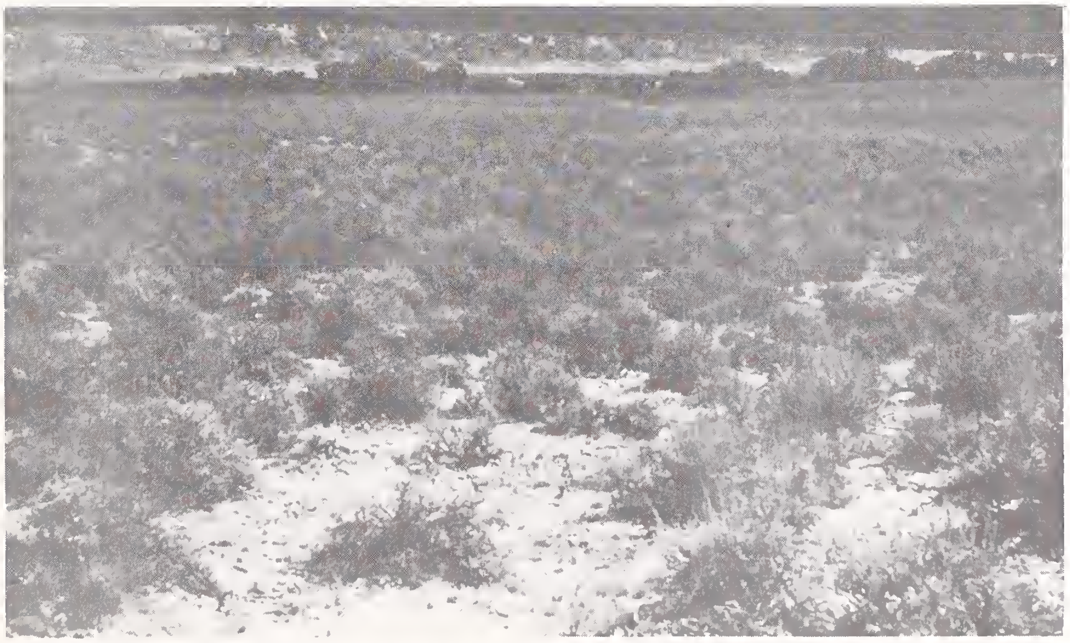
The primary approach is one of education, and ranchers are recognizing that good range management does pay. A well coordinated educational

Taller grasses such as ROUGH FESCUE, GREEN NEEDLE, BLUEBUNCH WHEATGRASS are abundant. Abundance of natural mulch covers the ground and lets moisture soak in the ground quickly. Forage production is at its highest, snow is held against blowing, runoff is at a minimum and erosion is controlled.

PRAIRIE JUNEGRASS, WESTERN WHEATGRASS, SANDBERG BLUEGRASS, and short-growing grasses have partly replaced the taller grasses. Bunches of Rough Fescue are scarce, Bluebunch wheatgrass plants are small. Rest during the growing season and moderate use will rapidly restore this range to excellent condition.



Very few of the original taller growing grasses remain. There is much bare ground, soil crusting, and runoff. Rainfall and snow are lost instead of stored for grass production. Forage production is greatly reduced. Erosion is active. Light to moderate use combined with complete rests during the growing season will restore this range.



Nature tries to keep ground covered with some kind of vegetation. When use is so heavy that taller growing species cannot survive, she substitutes unpalatable plants, annuals, or short-growing grasses that escape close grazing. Note bare ground exposed. Moisture for plant growth is reduced, forage production is at a minimum. Restoration will be slow but certain with use of conservation practices.

program developed in schools at all levels would acquaint the upcoming generation of ranchers with the value of and necessity for good range management. Demonstration ranches or areas of exceptional management noted at strategic points about the county would be of continuing interest to observant individuals. Range leaders will continue to coordinate the efforts of agencies to acquaint all persons in related industries and urban areas with the importance of range management and the economic and aesthetic values of good-to-excellent condition range. Informational meetings will be held to acquaint the general public with research data and technical and financial assistance available. A continuing public relations program will assist in keeping the program active, and in keeping control at the local level.

Coordinated planning between persons and agencies is being encouraged to increase planning efficiency and prevent duplication. Coordinated planning also minimizes the possibility of treatment practices conflicting with one another.

The Department of State Lands is encouraging good range management by its lease arrangements. School trust rangeland administered by the State Land Commissioner is leased for five- or ten-year periods. Use of these lands is governed by range management regulations and enforced through periodic inspections.

Benefits

General--The improvement of range condition is of primary importance and is the factor which permits increased production through additional use. Condition becomes increasingly important when drought, insects, economic factors, or other factors put short-term stresses upon the rangelands.

Financial--Economic benefits can be realized through increases in land value, livestock numbers, pounds of livestock products, lamb and calf crop percentages, marketing weights, tax base, and natural beauty. These will make a direct contribution to the general economy of Lewis and Clark County.

USABLE FORAGE PRODUCTION

Situation

It is estimated that Lewis and Clark County rangelands are presently producing at 50 percent of their potential.

Approach

A large percentage of the potential increase in production of ranges and pastures will be accomplished through the application of proven practices. Examples of these are rest rotation, deferred grazing, and fencing. In many areas, weed control will aid in improving range condition. Varieties of introduced grasses will also increase carrying capacity.

Usable forage protects the resource and produces abundant pounds of beef.

During the last 20 years, tremendous advances have been made in reseeding, fertilizing, and water retention practices. Many of these are still in the experimental stage, but a great number are proven and should be put into effect.

Many more demonstration plots and ranches are needed to show ranchers and the general public the possibilities in their home areas. In cases where soil moisture is adequate, field trials of fertilizers have been done on seeded areas.

Cultivating and reseeding of poor condition native ranges may be desirable since existing species will take longer to gain the necessary forage increase. In many instances the U.S. Department of Agriculture's Agricultural Conservation Program assists the improvement plan financially.

Benefits

General--Statistics indicate that between the years 1975 and 2012, world population will double (Brown et al., 1976). To contribute fairly to the increased demands for forage for domestic livestock, Lewis and Clark County rangelands must not only be maintained, but must be improved to provide maximum production.

Financial--The largest economic increase from forage will be from domestic livestock production. A definite increase in weaning weights will be realized from more and higher quality foods, and the result will be more pounds of meat produced from the range.

Stockwater pumped with wind power - a viable solution to water problems.

Livestock water - the lifeblood of range management.

STOCKWATER DEVELOPMENT

Situation

One of the most important factors in harvesting the maximum grass crop from our rangelands is a good supply of usable water, strategically located. Adequate stockwater facilities result in better distribution of livestock and, consequently, improved grazing management.

The distance that animals will travel for water depends upon the terrain, weather conditions, and kind of animals. Ordinarily, stock can travel from one half to one mile to water, but distances over one mile are usually considered too far for good range management. Similarly, animals that have to wait hours to satisfy their thirst lose time that should be spent grazing.

Research in recent years has been conducted on grazing patterns and the result measured in pounds of gain. The increased lamb and calf crop percentages have clearly shown the importance of water, its location, and its amount. For example, excellent condition range with an ample supply of drinking water will significantly out-produce the same type area where animals must travel excessive distances to drink.

To obtain the maximum efficiency in grazing distribution and harvesting of the grass, water is a significant factor, and it must be seriously considered in all range planning and development.

Approach

Springs, where available, are the most practical type of water development. Even when springs are available and in the proper location, they need to be developed and piped into troughs to assure maximum gain in weight and sanitary conditions.

During recent years, improvements by industry and advancements in research have opened the door to new and dramatic changes in our approach to water development on rangelands. With the development of plastic pipe, which can be installed by machine, water can be economically piped great distances.

Many unusual stock water situations can be solved with ingenuity and planning. Examples are pumps powered by water wheels that can be geared to raise water to great heights. Where ground water is unavailable by springs, pipelines, or wells, then artificial watersheds to collect and store runoff water should be considered.

In many cases, several operators or a combination of ranchers and agencies can join together in projects to develop large range areas that are little used because of inadequate water. Ranchers and agencies should be encouraged to coordinate planning of management practices that potentially will benefit one another. A good cooperative plan in many cases can help tremendously in both land development and good relationships between neighbors.

Benefits

General--Full development of remote, ungrazed areas or partially grazed sites will allow for an increase in both livestock and wild game numbers. It will also enhance wildlife habitat.

Erosion will be reduced somewhat by the cattle doing less trailing to and from water. Ranchers and agencies should properly develop the available water to prevent excess runoff or sedimentation and pollution.

Well developed ranges will survive periods of stress from unfavorable weather or economic conditions and show less abuse than poorly developed rangelands.

Financial--Well developed ranges will produce more pounds of livestock and more winter grazing. With adequate water, cattle may in some instances be allowed to graze during all or part of the winter with some concentrate feed, which can materially lower wintering costs.

Springs provide an excellent source of water.

INCREASED RECREATIONAL USE

Situation

The situation today is one of increasing demand for decreasing space.

It is true that large areas of public land are available to the general public. In addition, the average rancher today is still very generous, allowing most people the privilege of free trespass.

However, as the price-cost and efficiency squeeze continues, this privilege has a limited life expectancy. A large portion of private land is slowly being closed, as one rancher after another finds it impossible to operate with the general public freely traveling over his lands.

Approach

The most important factor relative to increased recreational use of the range and/or pasture lands is the condition of the vegetation. Range that is in good-to-excellent condition can better withstand trampling from people or disturbance by vehicles, while range in poor condition will deteriorate rapidly under light recreational pressure. Therefore, the basic programs of range improvement are necessary to increase recreational use.

Educational programs about the potential of the grasslands for recreational uses need to be initiated so that urban people will realize the enjoyment of grassland-based recreation. Landowners need to recognize that recreation represents a possible source of income. Also, they need to realize that they have a responsibility for the betterment of the general environment and the general well-being of our county.

In range management plans that include potential recreation development, such things as picnic areas and campsites must be considered. Whenever the attraction sites are large enough for and capable of supporting development, the construction of such facilities as tables, fireplaces, and toilets will cut down wear and tear on the land while obtaining optimum use.

The plans should also include roads and trails in locations that will reduce erosion and runoff. Roads must be sited so that people will follow them as they travel to the attraction areas. Well-planned access routes also help recreationists to be compatible with livestock movements.

Benefits

General--The rangelands are areas in which large numbers of confined urban people may potentially find relief from their crowded situations. A direct benefit of this would be a more healthy attitude in people, both rural and urban. In general, social values will be improved by having additional recreational areas available for people.

Financial--Income from recreation on grasslands comes in many forms, both direct and indirect. The most easily assessed will be the income to the private landholder who may wish to take advantage of the desires of the public and charge a fee for services, facilities, and use of the rangeland for recreational purposes. Some landowners may turn to recreation fees to get the maximum return from their holdings.

Nearby communities will be economically enhanced by more people coming from urban areas to enjoy the pleasures of the rangelands.

WILDLIFE HABITAT IMPROVEMENT

Situation

Wildlife are dependent on and products of their habitat. The quality and quantity of the habitat are a measure of the health of a wildlife population.

Lewis and Clark County is still blessed with a wide variety of mammals that could be increased in numbers, and perhaps even variety, if the habitat were improved. Such birds as grouse, ducks, geese, songbirds, etc., would also increase in number if the situation were favorable.

Man's presence must be taken into consideration. There will never be as many as the original numbers of some species, such as the buffalo, but a reasonable balance can be obtained with planning and development.

Approach

The first and by far the most important consideration necessary to attract or maintain a good wildlife population is an excellent cover of the proper vegetation. Ranges in good-to-excellent condition more easily support numerous varieties of small birds and mammals in large numbers with little competition among species.

Under this program, wildlife habitat is an integral part of management planning and implementation. Range management planning can easily accommodate a wide variety of species by taking into consideration the basic requirements of the wildlife. In some instances there may be a divergence of need for food, and more especially for shelter and nesting facilities for different kinds of wildlife. These needs should be recognized and generally can be reconciled in good management plans. Ranchers whose management plans provide for ample forage of the right kinds can more easily set aside reasonable areas that have wildlife habitat as their highest production.

Curbs on some types of animals are necessary to provide a good working and living balance. Wildlife, like livestock, must be kept in balance with the food supplies. In most instances, some hunter harvest of wildlife must occur.

Although the weed problem is a major priority, indiscriminate use of herbicides should not be allowed as wildlife habitat, water quality, and beneficial plants can be seriously affected. Use of herbicides, like that of pesticides and predator control measures, should be strictly supervised and be a part of the wildlife management program.

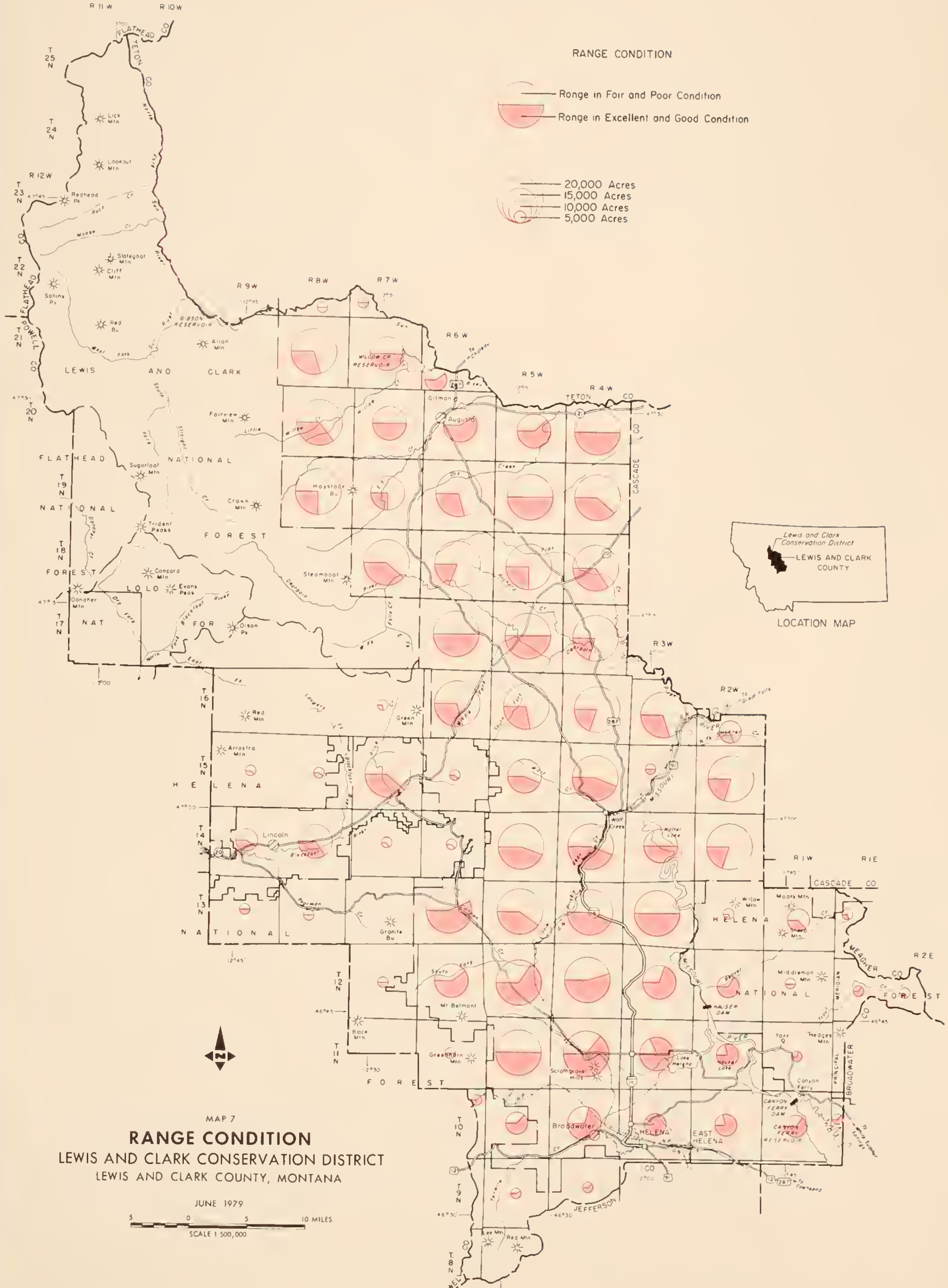
Since 65 percent of the forage for wildlife is produced on privately owned range, it is very important that good relations between landowners and sportsmen be maintained. With an improvement in range habitat, and with satisfactory landowner-sportsmen relations, stable wildlife populations and good game management can be accomplished.

Possibly, some provision could be made to compensate private landowners for feed taken by wildlife and for the inconvenience caused by sportsmen in connection with the wildlife program.

Benefits

Financial effects throughout the county resulting from improved wildlife habitat are quite difficult to separate from other general income categories. Increased numbers of game draw more sportsmen and their money--which is a direct benefit. Large varieties of birds and animals and improved scenic beauty may also attract people who are interested in such things as photography and other aesthetic values.

Rangeland in Lewis & Clark County supports a thriving livestock industry, a variety of wildlife, and provides an aesthetically pleasant surrounding for the recreationist.



MAP 7

RANGE CONDITION

LEWIS AND CLARK CONSERVATION DISTRICT
LEWIS AND CLARK COUNTY, MONTANA

JUNE 1979

5 0 5 10 MILES
SCALE 1 500,000

Source
Bose map prepared by SCS, WTSC Carto Unit from AMS 1:250,000 series.
Thematic detail compiled by state staff.

U S DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

M7-EN-24053-7

WILDLIFE

Big Game

Lewis and Clark County with its diversity of habitat types, ranks as one of the most important big game areas in Montana. Big game animals occupying the county include: mule deer, whitetailed deer, elk, moose, Rocky Mountain bighorn sheep, mountain goat, antelope, black and grizzly bear, and mountain lion. As in other portions of the state, winter range is the limiting factor regulating population density of grazing wildlife in the county. Winter range for a majority of the game animals is located at the lower elevations in the foothills, valleys, and plains, which also receive heavy use by man for grazing, urbanization, recreation, etc.

There are currently two major state-owned game ranges located within Lewis and Clark County: the Sun River Game Range west of Augusta and the Bear Tooth Game Range on the east side of Holter Lake. Both were bought primarily to provide winter range for elk; but they also receive use from mule deer, whitetailed deer, antelope and bighorn sheep.

Upland Game Birds

Species of upland game birds found in Lewis and Clark County include turkey, pheasant, mountain grouse, sharptailed grouse, Hungarian partridge, and ptarmigan. The numbers of these species attest to the diversity of the habitat in the county as their individual requirements range from elevations above timberline to river bottoms. Overall, upland game is abundant and widespread and in general considered under-utilized in the county.

Recreation

Lewis and Clark County offers many diverse forms of recreation for the outdoor enthusiast. Big game, waterfowl and upland bird hunting opportunities exist throughout the area. Back country hunts or sight seeing trips into the Bob Marshall, Scapegoat, or Gates of the Mountains Wilderness areas are available to the individual hiker, backpacker or guest of several guides and outfitters. Loop roads through mountainous terrains provide the opportunity for recreational driving and sightseeing. In addition, state and federally operated campgrounds and access areas are available, both in the mountains and along lakes and streams, for public use.

Large areas are also available for boating, snowmobiling, cross country skiing, photography, dog sledding, downhill skiing, plant and mineral collecting, etc.

Waterfowl

Good populations of ducks and geese use the many miles of rivers and lakes as well as potholes and farm ponds in all seasons of the year except winter. While most waterfowl migrate during the winter months,

large concentrations of ducks may be found in the county utilizing open water on rivers and streams and adjacent small grain fields as food sources.

Numbers of waterfowl raised in the county could be increased through the implementation of grazing systems that would increase the number of stock dams and reduce overgrazing around small water areas.

Rare and Endangered Species

Rare, endangered, or threatened species occurring within the county include: bald eagles, osprey, prairie and perrigrine falcons, grizzly bear, river otter, and Rocky Mountain wolf. Efforts should be made to protect and increase the habitats occupied by these animals.

Furbearers

Wetland areas in the county provide habitat for beaver, muskrat, mink and otter. Again, properly managed grazing systems would increase the size of these populations.

Non-Game

More than 200 species of non-game animals, birds, reptiles, and amphibians inhabit Lewis and Clark County.

Wildlife Resources

West of the Continental Divide (Upper Blackfoot-Lincoln Area)

Big Game

One of the major attractions of the District is the wildlife resources. Big game present in the area include: whitetailed deer, mule deer, elk, moose, mountain goat, mountain lion, black bear, and grizzly bear. Populations of these animals are dependent on suitable habitat. Summer ranges are extensive and capable of sustaining relatively large populations. However, available winter range appears to be the limiting factor on population size.

Most of the winter range areas are in the lower elevation foothills and valleys. It is in this same general area where man's year-round activities are concentrated.

Upland Game

Upland game that inhabits the area includes blue grouse, ruffed grouse, spruce grouse, and possibly whitetailed ptarmigan. Upland game birds are generally widespread in the area with each species present only where the habitat meets it specific requirements.

Waterfowl and Furbearers

Waterfowl are present along the Blackfoot River in fair numbers in the summer and fall. The river and its tributaries also provide a home for beaver and mink. Pine marten, fisher, wolverine, and lynx are present in the mountainous portions of the area.

Threatened and Endangered Species

The endangered northern Rocky Mountain wolf could easily occur in the District.

The grizzly bear, a threatened species, is present in the area.

Bald eagles winter along the Blackfoot River and may nest in the area.

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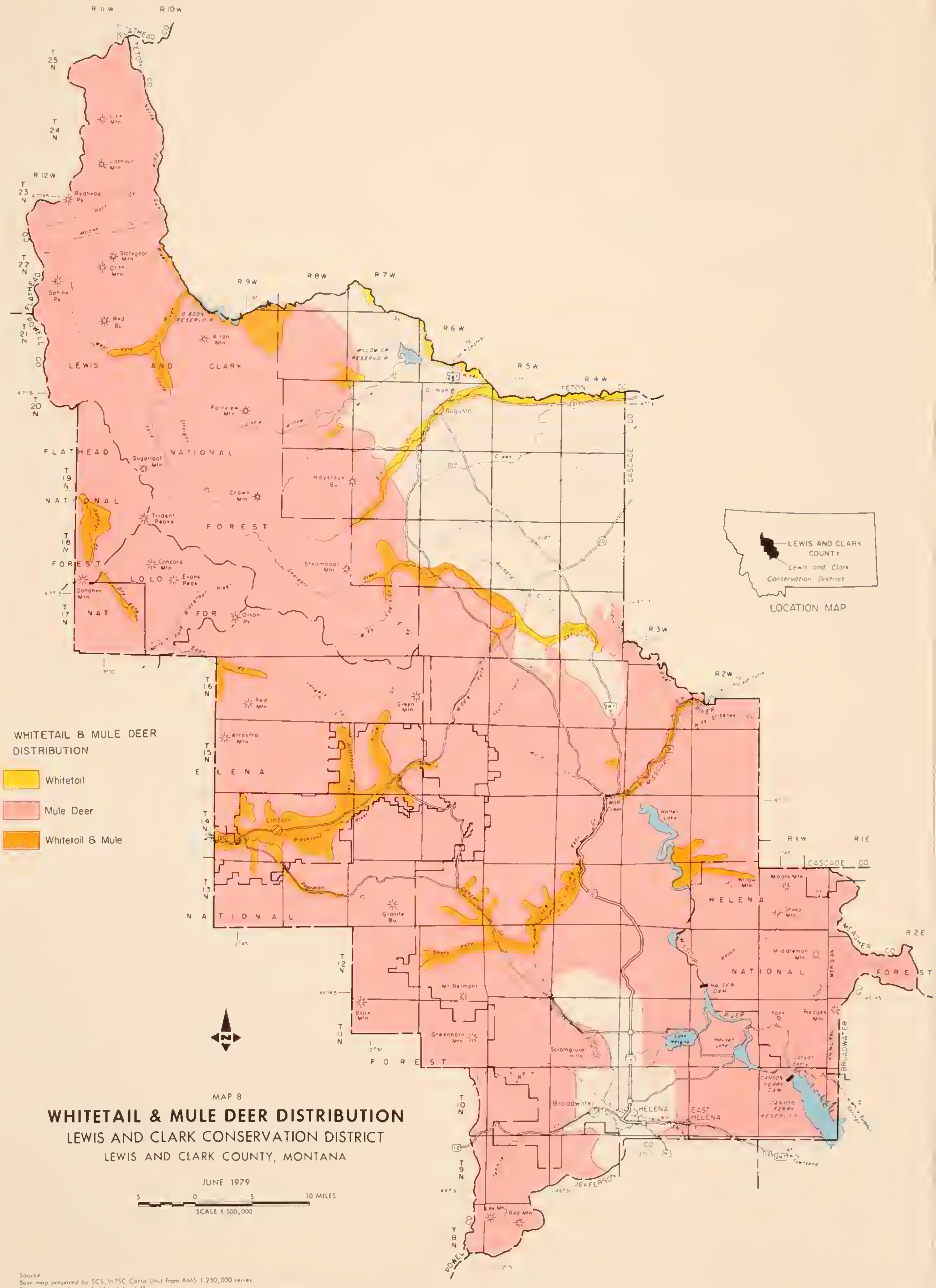


MAP 8

WHITETAIL & MULE DEER DISTRIBUTION

LEWIS AND CLARK CONSERVATION DISTRICT
LEWIS AND CLARK COUNTY, MONTANA

JUNE 1979

5 0 5 10 MILES
SCALE 1 500,000

Source
Base map prepared by SCS, WTSC Carto Unit from AMS 1 250,000 series
Thematic detail compiled by state staff.

U S DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

M7-EN-24053-8

HABITAT CAPABILITY CLASSES

CLASS I

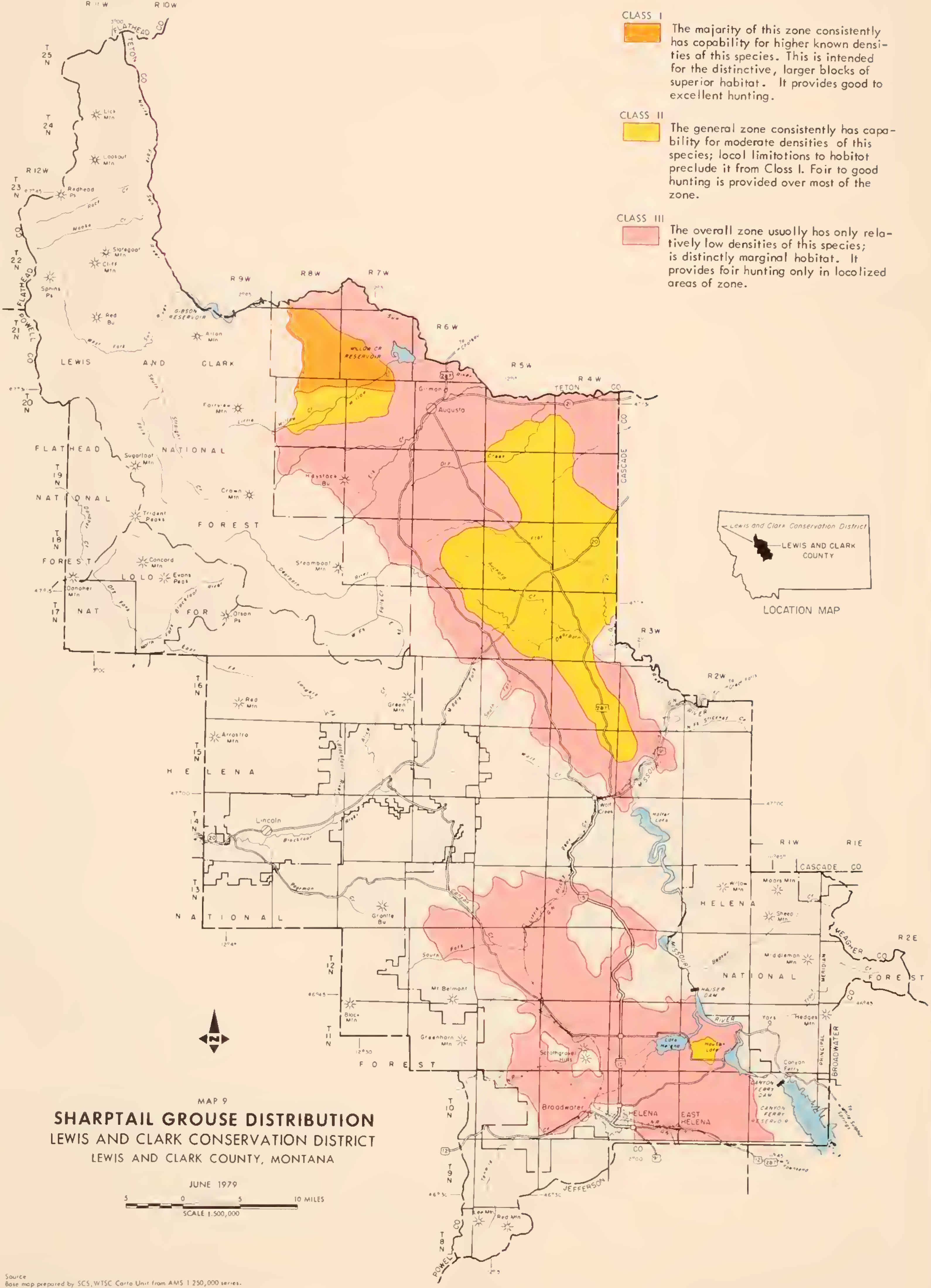
🟧 The majority of this zone consistently has capability for higher known densities of this species. This is intended for the distinctive, larger blocks of superior habitat. It provides good to excellent hunting.

CLASS II

🟨 The general zone consistently has capability for moderate densities of this species; local limitations to habitat preclude it from Class I. Fair to good hunting is provided over most of the zone.

CLASS III

🟥 The overall zone usually has only relatively low densities of this species; is distinctly marginal habitat. It provides fair hunting only in localized areas of zone.



MAP 9

SHARPTAIL GROUSE DISTRIBUTION

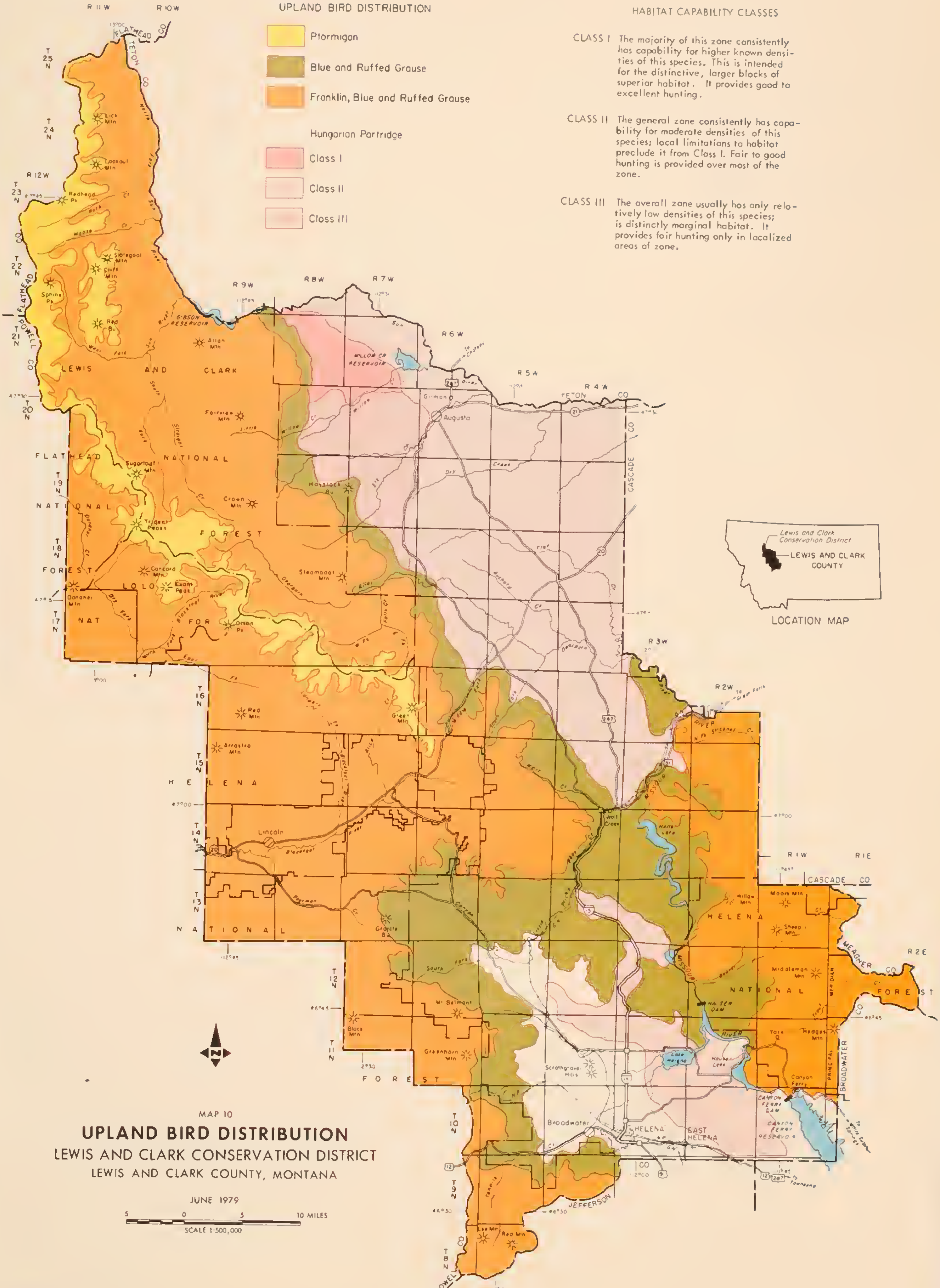
LEWIS AND CLARK CONSERVATION DISTRICT
LEWIS AND CLARK COUNTY, MONTANA

JUNE 1979

Source
Base map prepared by SCS, WTSC Carto Unit from AMS 1 250,000 series.
Thematic detail compiled by state staff.

U S DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

7-EN-24053-9



UPLAND BIRD DISTRIBUTION

🟨	Ptarmigan
🟩	Blue and Ruffed Grouse
🟧	Franklin, Blue and Ruffed Grouse
	Hungarian Partridge
🟥	Class I
▨	Class II
▨	Class III

HABITAT CAPABILITY CLASSES

CLASS I The majority of this zone consistently has capability for higher known densities of this species. This is intended for the distinctive, larger blocks of superior habitat. It provides good to excellent hunting.

CLASS II The general zone consistently has capability for moderate densities of this species; local limitations to habitat preclude it from Class I. Fair to good hunting is provided over most of the zone.

CLASS III The overall zone usually has only relatively low densities of this species; is distinctly marginal habitat. It provides fair hunting only in localized areas of zone.

MAP 10

UPLAND BIRD DISTRIBUTION

LEWIS AND CLARK CONSERVATION DISTRICT
LEWIS AND CLARK COUNTY, MONTANA

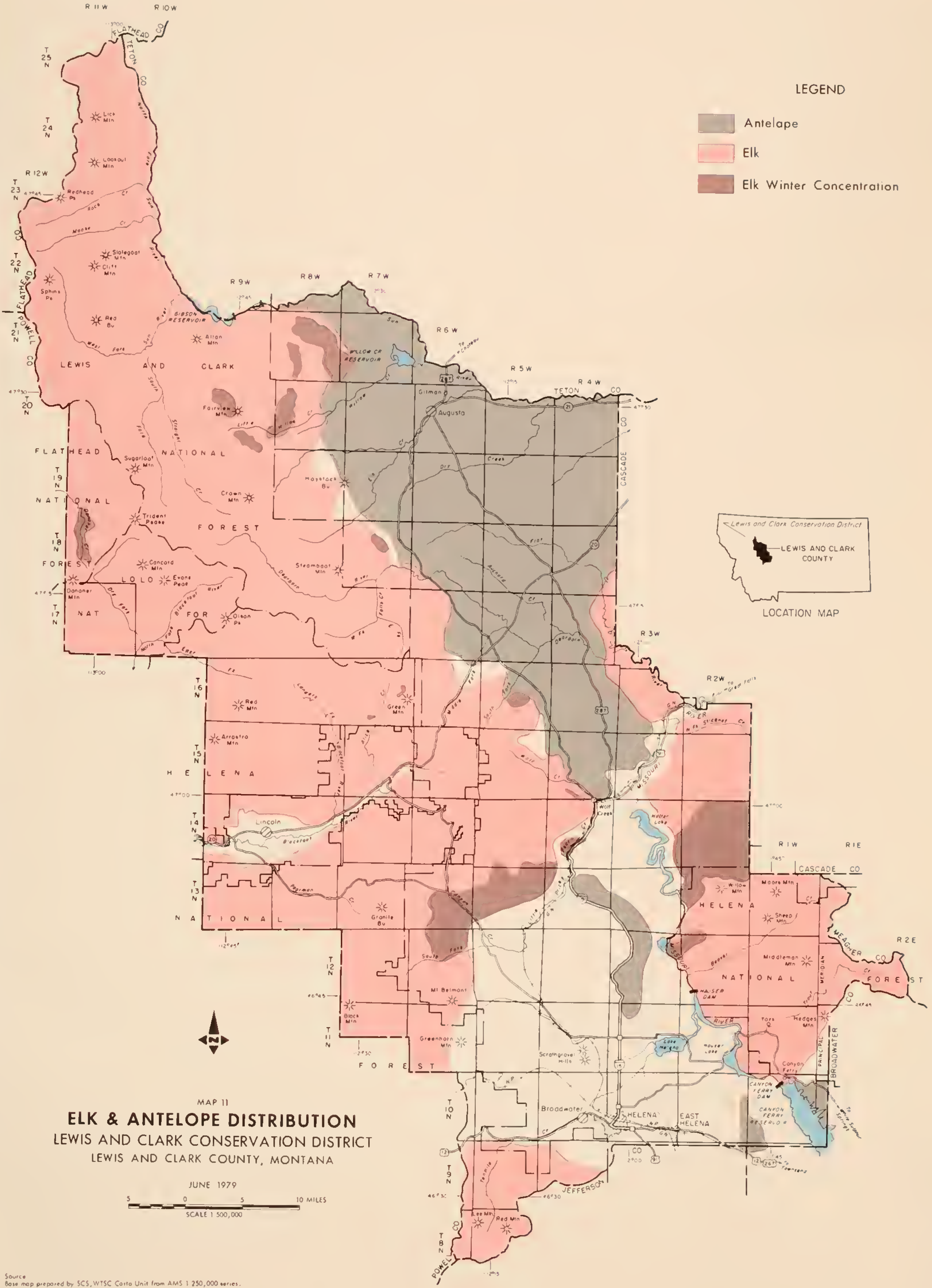
JUNE 1979

5 0 5 10 MILES
SCALE 1:500,000

Source
Base map prepared by SCS, WTSC Carto Unit from AMS 1 250,000 series.
Thematic detail compiled by state staff.

U S DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

M7-EN-24053-10



MAP 11

ELK & ANTELOPE DISTRIBUTION

LEWIS AND CLARK CONSERVATION DISTRICT
LEWIS AND CLARK COUNTY, MONTANA

JUNE 1979

5 0 5 10 MILES
SCALE 1 500,000

Source
Base map prepared by SCS, WTSC Carto Unit from AMS 1 250,000 series.
Thematic detail compiled by state staff.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

7-EN-24053-11

V NATIONAL FOREST

NATIONAL FORESTS

The national forests furnish water recreation, wildlife, timber, forage, and minerals from land carefully managed as multiple use public properties. These natural resources are vital to America's industry and people.

Portions of the Flathead, Helena, Lewis and Clark, and Lolo National Forests lie in Lewis and Clark County. These are four of the ten national forests located in Montana. The area of these forests in the county contains portions of six ranger districts. On the Helena Forest these districts are: the Helena-Canyon Ferry District which includes, besides areas in other counties, the area on the west slopes of the Big Belt Mountains from lower Magpie Gulch north to include Willow Creek, all located east of the Missouri River; Upper Dog Creek, a tributary of the Little Blackfoot River on the west slopes of the Continental Divide and includes the Blackfoot River and its tributaries, which drain into the Clark Fork of the Columbia River.

On the Lewis and Clark Forest these districts are the Sun River District, which includes the area drained by Falls Creek, the Dearborn River and its tributaries, tributaries of the South Fork of the Sun River and all of the North Fork of the Sun River south and west of this drainage as far north as the Moose Creek divide and the Teton District, which includes all of the area west of the North Fork of the Sun River north from and including Moose Creek.

On the Lolo Forest, a part of the Seeley Lake Ranger District is located in the county. This is drained by the North Fork of the Blackfoot River and its tributaries, Dry Fork and East Fork.

On the Flathead Forest, a part of the Big Prairie Ranger District is included in the county. This is drained by Danaher Creek, a tributary of the South Fork of the Flathead River.

Since a substantial portion of the national forest area in the county was made up of grassy stream bottoms and open or partly open mountain slopes or ridge tops, livestock raising proved to be an important part of the local economy for the early settler and those who followed him.

After the original area of public domain was set aside by Presidential Proclamation as the Helena, Lewis and Clark, Lolo, and Flathead National Forests in 1906, the use of the grazing areas within their boundaries was controlled by a permit system of grazing, designed to properly use available grazing lands so that they would continue to produce livestock feed year after year. This system has continued until the present time. In 1978 a total of 15,500 cattle, 270 horses, and 17,400 sheep were permitted to graze on national forest ranges in this county on some 99 allotments.

Seasons of use vary between allotments and are based on the vegetative readiness and climate limitations on each allotment. The average season for cattle is from June 1 to September 30, and for sheep July 1 to September 15. In order to provide for the maximum quantity and quality of water production and obtain optimum use of range forage, the primary objective of the Forest Service is to balance grazing use with other resource values.

Nearly all of the cattle permitted are owned by stockmen who have obtained a preference use of these ranges through prior use over a long period. Each permittee, to qualify, must own a ranch which will produce hay and forage sufficient to carry his permitted stock through the period they graze off the forest range. In this manner the forest permit rounds out a complete and economic ranching operation. A fee is charged each year for the privilege of grazing on national forest range. This fee is based on the forage value index which is based on private grazing.

In line with the principle of multiple and wise use of the natural resources, all uses of the national forests are managed and coordinated for maximum good water management. The Helena National Forest supplies the domestic water supplies for the cities of Helena and East Helena in the amounts of 6 3/4 to 9 million gallons, and 140 to 200 thousand gallons daily, respectively.

The national forest area in this county supports a fair stand of ponderosa pine, douglas fir, lodgepole pine and englemann spruce, commercial timber of the type found in central Montana. All timber cut from the national forests is in accordance with an overall management plan designed to harvest ripe timber and leave the residue stands in thrifty condition both to regenerate timber for the future and to maintain and improve watershed values at optimum levels.

Timber sale contracts require that the operator either dispose of the resulting slash in a manner conducive to good fire prevention and erosion control principles or deposit funds into a cooperative work allotments to be used by the Forest Service in doing such work. This reduces the fire hazard and provides for erosion control on sale areas where abuse of unstable soils would contribute to serious siltation of existing streams.

Recreation is a major use of the national forest lands in the county. This use will steadily increase in the future with increased leisure and population. In 1977 the estimated amount of recreationalist use to the national forest areas in the county approximated 242,600 visitor days (one visitor day equals 12 hours).

Camping and picnicking facilities are provided on several improved campgrounds in the various districts. These are, Ten Mile, Porcupine, Moose Creek, Coulter, Vigilante, Pike Gulch, Meriwether, on the Helena-Canyon Ferry Ranger District; Aspen Grove and Cooper Creek on the Lincoln District; South Fork, Bench Mark, Home Gulch, Wood Lake on the Sun River District.

Adequate sanitation facilities are provided, such as safe drinking water, sanitary toilets and adequate garbage disposal. These measures protect not only the health of the recreationalist but also prevent contamination of adjacent streams or springs.

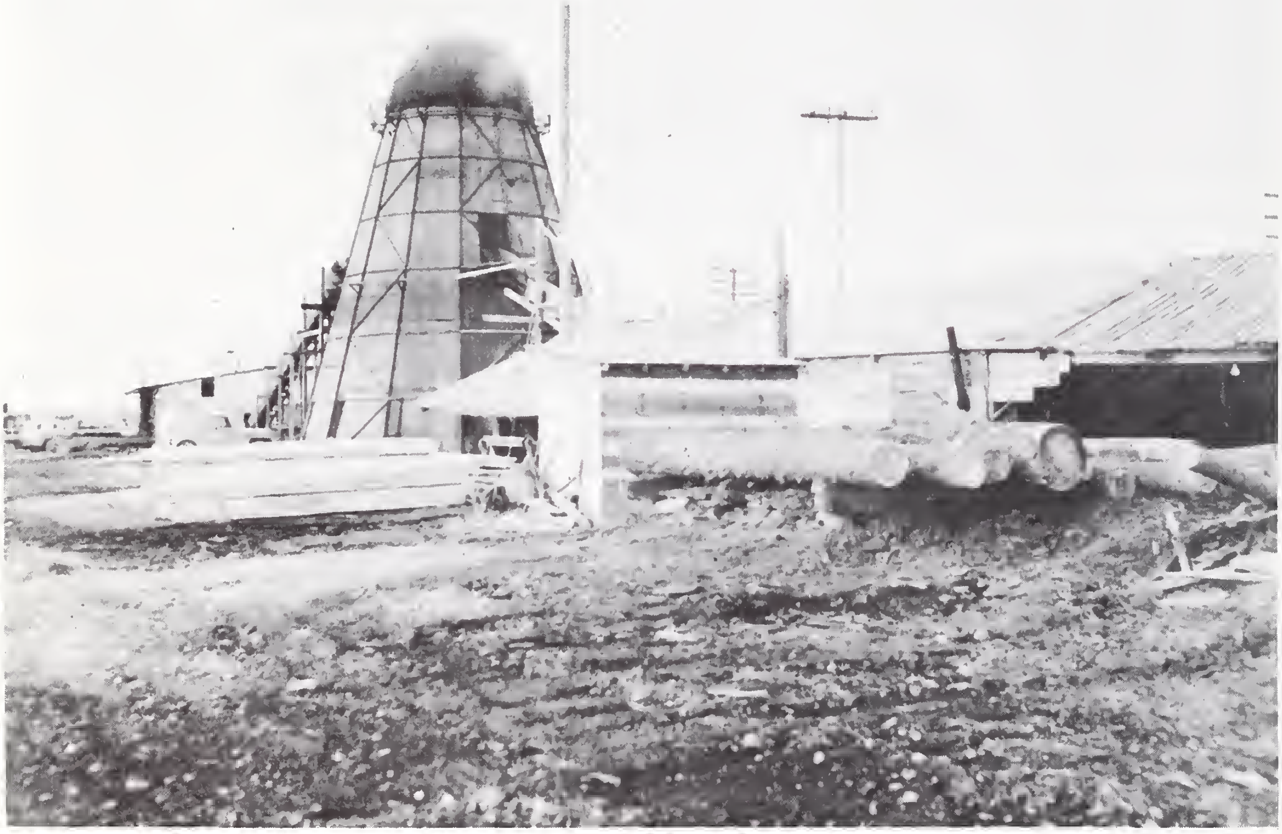
One of the important recreation uses of the national forests in the county is made by hunters and fishermen. It is estimated that hunters use the national forest area 27,200 visitor days and fishermen 15,100 visitor days annually. This area provides a habitat for 8,100 elk, 9,600 mule deer, 1,400 white-tail deer, 90 moose, 800 black and 80 grizzly bear, 500 mountain sheep and 400 mountain goats.

A portion of the 990,900-acre Bob Marshall and 239,000 acre Scapegoat Wildernesses is located in the northernmost corner of the county in Flathead, Lewis and Clark and Lolo Forests. This is primarily a country for extensive saddle and pack trips and hiking opportunities. There are many streams and a few lakes affording excellent fishing. Game animals of all kinds are abundant. The Chineses Wall, which breaks to the east in sheer 1,000-foot cliffs for 20 miles along the Continental Divide, is a unique attraction.

There has been a sharper increase in deer numbers in the past decade to the extent that damage is noted on critical winter deer ranges. Special efforts through the Montana State Fish and Game Department have been and are being made to protect the watershed values by the reduction of deer numbers through increased bag limits, either sex kills and special seasons. Big game numbers under a multiple use scheme of management should be kept in balance with other uses made of the national forest lands.

Since the peak of deer populations in the late 1950's and early 1960's, deer numbers have declined throughout the western states. Presently, they appear to be slowly building again. Elk numbers have increased in this same time period in Lewis and Clark County, probably to all time highs. Local depredations by elk on private lands have precipitated occasional controlled hunts. Moose populations have expanded; however, distribution may be somewhat reduced.

By law, twenty-five percent of the earnings from timber sales, grazing fees and other commercial uses of the national forests is returned to the State each year for distribution to the counties in which national forests are located to help maintain public schools and roads. An additional ten percent is used locally for construction and maintenance of roads and trails. The remaining sixty-five percent is deposited in the U.S. Treasury and may be disbursed only by congressional appropriation. For fiscal year 1977, Lewis and Clark County received as its share of the twenty-five percent fund disbursement $148,013.60.



A renewable natural resource being processed into building material.

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VI RECREATION AND HISTORIC SITES

Recreational Land Management and Associated Problems

All of the land in Lewis and Clark County is owned by somebody, whether it be public land or the most intensively managed private agricultural land, and land ownership patterns are frequently the strongest determinant of outdoor recreation patterns in an area.

The amount of land which is open to an outdoor recreational form generally should be inversely proportional to the amount of damage which that particular recreational form potentially can cause to the land. Extremely damaging recreational forms, such as motorcycle hill climbing, are usually limited to a few defined areas and discouraged elsewhere. Probably the only recreational form which is allowed absolutely everywhere is sight-seeing. Some of the most scenic areas of the county are private agricultural holdings where any kind of physical trespass is strongly discouraged, but the scenery can easily be enjoyed from the public highways which pass through these areas. Even private or otherwise inaccessible land can be considered "recreational" in that it can be seen and enjoyed and thus plays a major role in completing somebody's recreational experience.

Physical abuse of private land by outdoor recreationists and the resultant closing of that land to further recreation is the greatest single outdoor recreational problem in Lewis and Clark County. This problem has reached crisis proportions in those areas where an attractive public recreational facility exists in the midst of private agricultural holdings. This is true of the Holter Lake-Wolf Creek area, where a combination of factors attracts great numbers of recreationists who frequently spill over into private ranch lands. Ranchers in this and other areas have suffered considerable losses at the hands of recreationists who lack the necessary respect for private property rights. This problem is dealt with to some length in the sub-area narratives to follow.

There are considerable areas of public state and federal land in Lewis and Clark County but much of this land is not really "public" in every sense of that word. Much of the state land is leased to private ranchers, and thus is as inaccessible to general recreation as is the surrounding private land. Other state land is managed by the Montana Fish and Game Department as game range and thus outdoor recreation in these areas must be limited to what is compatible with good game management. Much BLM land leased for agriculture is still open for public recreation although permission is always required to cross private land to get to it, and the recreational use of this land must not conflict with its agricultural use.

The national forests, "the nation's playgrounds," are beset with problems of their own. Outdoor recreation on these lands is becoming increasingly more regulated in response to pressure by rapidly increasing numbers of recreationists with increasingly sophisticated recreational hardware at their disposal. It is becoming more necessary all the time to minimize the conflicts between hardware-intensive forms of outdoor recreation such as snowmobiling, trail bike use, etc., and the resource itself, which we now know to be a lot more fragile than we once thought it to be. In some areas, the concentration of recreationists in certain attractive but fragile areas is causing great problems, and conflicts between recreationists are increasing all of the time.

There is one major problem which is shared by all of the land managers in the county, public and private, and this is the lack of manhours available to keep up with the rapidly changing outdoor recreational situation. Most ranchers cannot afford to patrol their fence lines day and night, and the County government is hard pressed to attempt to do so. The state and federal agencies are all being pinched by increasingly tight recreation budgets and they cannot yet afford to hire the manpower necessary to look after their own lands and to patrol the boundaries between public recreational land and private land.

Given that the land managers are as yet unable to regulate the recreationists, it is obvious that the recreationists have a responsibility to regulate themselves if they are to continue using the land. We all have a right to enjoy our own favorite landscapes, and will also have the attendant duty to protect those landscapes and to recognize the rights of others to them. There are a few encouraging signs that recreationists are acquiring a land ethic, but there is also much to be discouraged about. This recreation plan is designed to deal with the discouraging facts. Once we have all acquired a land ethic, we will not need outdoor recreation plans.

The most serious and widespread problems stemming from outdoor recreation practices in Lewis and Clark County can be grouped and outlined under three major headings as described in the following.

1. Conflicts

Several kinds of conflict exist in outdoor recreation practice and management, and in many cases we lack adequate means for resolving them. Real or potential conflicts exist between the following:

- Outdoor Recreationists and Landowners

This conflict results in losses to the landowner in terms of property damage and waste of time and manpower, and losses to the recreationist in terms of access denied, opportunity lost, and ill will engendered. Adequate procedures whereby wronged landowners or recreationists can have their grievances heard with some reasonable expectation of obtaining results do not exist at this time.

- Recreationists and Other Recreationists

Some forms of outdoor recreation are clearly incompatible with each other, such as cross-country skiing vs. snowmobiling. When two incompatible recreationists use the same area, the quality of the recreational experience is greatly reduced for both and, in some cases, a real safety hazard exists.

- Public and Private Outdoor Recreational Development Efforts

In some cases a private landowner will do something with his land which will jeopardize recreational opportunities on adjacent public land, or vice versa. Also there are situations in which the recreational overflow from developments on public land conflict with other land uses on adjacent private land.

2. Damage to Resource

The outdoor recreational resource is being damaged in some areas through simple overuse or unrestrained abuse by particularly damaging recreational forms.

- Unrestrained O.R.V. Use

Off-road-vehicles of various types have an initial and lasting environmental impact far beyond that of nonmechanized recreationists. Particularly fragile ecosystems, such as alpine meadows and shallow soil areas, can be permanently destroyed by only a few passes by an O.R.V.; and more durable ecosystems can be easily damaged by only moderate O.R.V. activity.

- Increased Population

All of these trends are further acclerated by the simple fact that our population is increasing, and it is increasing most rapidly near areas of readily available recreational opportunity.

In short, there are suddenly more recreationists than ever before. This outdoor recreation explosion is putting unprecedented pressure on the recreational resource. The undeveloped mountains, forests, and waterways which previously seemed almost infinite now seem very finite indeed and extremely fragile. Planning for the best use of this resource is essential now.

Montana has not escaped the adverse effects of the outdoor recreation explosion, although the problems in Montana are not yet as severe as they are in some other states. Montanans are fortunate in that we still have time to plan, to perhaps learn from the mistakes of other areas, and to head off the foreseeable conflicts and problems before irreparable damage has been done. Several state agencies, including the Montana Fish and Game Department and the Department of State Lands, have undertaken outdoor recreation planning. In addition to this, the U. S. Forest Service and the Bureau of Land Management are actively involved in recreation planning for their lands within Montana.

RECREATION BY SUB-AREA IN LEWIS AND CLARK COUNTY

The District recognizes that an abundant variety of outdoor recreation is an important factor as it relates to a quality life. This not only applies to residents but also the visitors of the county.

Lewis and Clark County is a big area, sprawled across the Continental Divide, and probably contains the greatest variety of landscapes of any county in Montana. These landscapes range from bottom lands along its rivers and streams, to rolling prairie lands, to almost vertical glaciated mountains and forested slopes. These landscapes with their built in challenges and attractions are the raw material for high quality outdoor recreation. Each kind of landscape is well suited for practical outdoor recreational forms and not at all suited for others, and each kind of landscape tends to attract its own kind of recreationists.

Some of our landscapes are recreational resources of national significance, having the uniqueness and potential to attract recreationists from throughout the United States. Included in this category are the vast Bob Marshall-Scapegoat Wilderness, one of the finest and largest tracts of back-country left in the nation, and the Helena historic district, which contains a concentration of fine old buildings at a time when we are becoming increasingly aware of the role of architecture in defining our national heritage.

Other landscapes, while not necessarily of national significance, are of great regional importance attracting great numbers of recreationists from a large part of central Montana, including the population centers of Butte, Bozeman, and Great Falls, as well as from Helena. The most obvious of these regional attractions are the Canyon Ferry, Holter, and Gibson Reservoirs, but our prime hunting, fishing, hiking, and scenic areas are also regional attractions. Some landscapes become regional attractions for certain brief periods during the year, such as Augusta during rodeo weekend and Helena during the Last Chance Stampede. The northern two thirds of Lewis and Clark County attracts very large numbers of recreationists from populous Cascade County.

Finally, there is the vast number of landscapes which, while not necessarily being of national or regional importance, do comprise the background and the setting for the daily lives of Lewis and Clark County residents. These are the areas close to home which are enjoyed by county residents on holidays, weekends, evenings, or other brief periods of free time; or it may simply be the scenery we enjoy while driving to work or gazing out of the window. This passive form of landscape enjoyment is a subtle but very important form of recreation. This category would include the mountains adjacent to the south edge of Helena, and everybody's local lake, swimming hole, cabin site, fishing stream, toboggan hill, etc.

Lewis and Clark County offers many varied kinds of recreational opportunities. To name a few: hunting, fishing, skiing, snowmobiling, water sports, camping, sightseeing, and many other enjoyable outdoor activities.

There is an increasing demand for outdoor recreation activities which involve facilities and access. To meet this demand, planning for the future and implementation should be accelerated.

Outdoor Recreationists in Lewis and Clark County

The people who enjoy Lewis and Clark County's recreational resource can initially be divided into two groups: those who are merely passing through the county on their way to someplace else, and those for whom the county is a primary recreational destination.

First of all, there are those who come from all parts of the United States specifically to enjoy the county's landscapes which are of national significance. Included in this group are the well-equipped and usually well-heeled hunters who come to the Bob Marshall-Scapegoat Wilderness from all parts of the country every fall. There are those who come to hunt game found in few other places, such as the grizzly bear, and there are also those who are willing and able to travel long distances simply to enjoy the emotional experience of hiking in true wilderness or following Lewis and Clark's exploration route. They, in general, are a rather elite group of recreationists who have come to enjoy the best that the county has to offer, and they usually have a high regard for what they find here. There are relatively few of them but their numbers are likely to increase as the merits of our unique landscapes become more widely known.

Secondly, there are the vast numbers of regionally-based outdoor recreationists. Most of this group comes from Great Falls; in fact some areas in the northern and central parts of Lewis and Clark County are visited almost exclusively by Cascade County residents. This is true of the Gibson Reservoir area, and to a lesser extent, the Holter Lake-Missouri River-I 15 Corridor north of the Gates of the Mountains. This concentration of Cascade County recreationists occurs because of Cascade County's relatively large population, the lack of similar attractions in Cascade County, and the easy accessibility of the landscapes in Lewis and Clark County.

Canyon Ferry Lake is the largest and one of the most attractive and easily accessible lakes in a large area of central Montana, and thus it draws many recreationists from other counties. People from Butte, Bozeman, and Great Falls, as well as from the Helena area, make Canyon Ferry Lake the most intensively used recreational feature in Lewis and Clark County. A Montana Fish and Game Department survey indicates that residents of the region including Lewis and Clark, Powell, and Jefferson Counties place a relatively greater emphasis upon water-based recreation than most other Montana residents, and most of this emphasis is felt by Canyon Ferry Lake and the other accessible areas along the Missouri River Corridor.

Other activities, particularly hunting, fishing, and sight-seeing, also attract recreationists from nearby counties. If the high price of travel continues to erode the American tradition of taking long summer vacation trips, Lewis and Clark County will begin to play host to greater numbers of regionally-based recreationists and relatively fewer out-of-staters.

The final group of outdoor recreationists consists of county residents. Over 90 percent of Lewis and Clark County's population is concentrated in the Helena area in the extreme southern end of the county, and thus most of the county-based outdoor recreational activity is close to home in the southern 1/3 of the county. Helena area residents are especially active in the Missouri River Corridor south of the Gates of the Mountains, the Canyon Ferry Lake area, the Big-Belt Mountains, and the unnamed mountain ranges to the south and west of Helena. In that section of the county north of a line drawn roughly east to west through Lincoln and Sieben, local residents are generally outnumbered by Cascade County residents, although there are a great many excellent opportunities for the residents of Lincoln, Augusta, and Wolf Creek, as well as the rest of the county, to enjoy the highest quality outdoor recreation within a few miles of home. Many people live in communities like Lincoln precisely for this purpose. There will be considerable discussion of the needs, expectations, and rights of county-based recreationists in the sub-area narratives which follow these introductory remarks.

Important Attractions to Recreationists

Bob Marshall - Benchmark Area

Discussion:

This spectacularly scenic and rugged sub-area contains large tracts of designated wilderness and roadless areas as well as considerable areas of prime game range, both in the high country and in the glaciated transition zone between prairie and mountain. This is one of the last areas where such almost legendary animals as the grizzly bear, mountain lion, wolverine, and possibly even the timber wolf, can still be found in the wild. The knowledge of their presence, together with the other big game, the high, open, and rugged topography, and the general scarcity of man's works upon the landscape combine to create a strong attraction for rugged outdoor recreation of a uniquely western cast. Wilderness hiking and backpacking, mountain climbing, fishing, and big game hunting are all in their element here, and the whole area imparts a strong feeling that this is what all of Montana was like a long time ago, as suggested by old stories and the art of Charlie Russell.

Problems:

Recreational use of this area is concentrated in certain small areas to such a degree that severe damage is occurring in these areas. Certain popular trails, back-country camps, wilderness jump-off points, and roadside strips are being grossly overused while many other areas could easily absorb additional use. Signs of concentrated overuse include damage to soil, slope-stability, vegetation, wildlife stability, as well as littering, vehicular abuse, and a general severe deterioration of the area's unique recreational attraction.

Potential:

Despite areas of concentrated overuse, this area as a whole can absorb additional recreational use, as it must given its proximity to Great Falls and the national and regional attraction of the wilderness areas and big game. The area has considerable potential which is being understated, such as alternate wilderness jump-off points, historical significance, and general outdoor recreation outside of the wilderness area.

General Recommendations:

Recreational forms which are potentially incompatible with the maintenance of the recognized prime recreational resources of this area (wilderness and wildlife) should be regulated and diverted to areas where their impact is the least. Such potentially harmful recreational forms include off-road vehicular use and the establishment of summer recreational homes.

Gibson Dam - Sun River Area

Discussion:

This small sub-area is centered around Gibson Reservoir and the Sun River Canyon from Alkali Flat west to the dam. This is an extremely popular recreation area for residents of Great Falls, but is subject to relatively little use from residents of Helena or other parts of Lewis and Clark County. It is an interesting area scenically, as the canyon cuts across several narrow parallel ridges of the Rocky Mountain front at a right angle, resulting in a wide variety of landscapes and view points concentrated in a small area. Gibson Reservoir, despite a severe drawdown in late summer, is a popular water-recreation area. The upper end of the lake is at the threshold of the Bob Marshall Wilderness. Below the dam there are several camping, fishing, and picnic areas, and the whole sub-area is a popular location for summer cabins. Many kinds of wildlife, including big game and rare wilderness species, frequent the area, and big horn sheep are often seen from the roads serving the recreation sites.

Problems:

The problems of this sub-area are the typical problems of an easily accessible, popular recreation area. Certain camping and picnic sites, water access sites, and roadside strips are being overused, with resultant damage to soil, slope, and vegetation. The lake may have reached its capacity to absorb water-borne recreationists without conflict and off-road vehicles are causing damage in some areas.

Potential:

This area will continue to be a popular destination of Great Falls-based recreationists and it can probably tolerate a reasonable increase in outdoor recreation if steps are taken to regulate the most damaging forms and minimize the individual impact of recreationists. Additional study is needed to determine the best specific management program for such small, compact, extremely popular areas. It is obvious that they should be managed differently than larger areas subject to only dispersed use.

General Recommendations:

1. Since the area is actually shared by both Lewis and Clark and Teton Counties, since most of the recreationists enjoying the area are residents of Cascade County, and since the area is very popular and subject to concentrated recreational use, specific and detailed planning for the area should be approached by all three counties working together with Forest Service, Fish and Game Department, and private landowners having an interest in the area. Until such an intensive effort can begin, it is meaningless to make more specific recommendations for the area, other than to say that more intensive management is needed, and that nothing should be done which would aggravate the overuse situation.

2. This area seems to be an excellent area in which to increase the opportunity for passive recreation for elderly, handicapped, or otherwise immobile people because of its good roads, exciting and variable scenery, water features, excellent opportunity for viewing wildlife, and proximity to Great Falls.

Haystack Butte - Scapegoat - Danaher Area

Discussion:

This is a very spectacular region in terms of topography, wildlife, and the sheer expanse of wild, essentially undeveloped country. Much of it has recently been designated as wilderness, but the sub-area also embraces large tracts of private east slope ranching land in the vicinity of Haystack Butte and Bean Lake, and areas of non-wilderness forest. The highest peak in the county, Scapegoat Mountain, is on the northern edge of the sub-area and the surrounding wilderness, seldom visited by man, is a wildland resource of great value. In most respects, this area is similar to Area No. 1 to the north, but it has managed to escape the heavy, concentrated recreational pressure which Area No. 1 is subject to. It is a region which still offers generous measures of an increasingly scarce wilderness offering - absolute solitude.

Problems:

The full outdoor recreational potential of this area is not being appreciated at the present time because of a general lack of public awareness and certain physical access difficulties. The overriding problem woud be to increase recreational use of this area, thus relieving pressure on other areas and enriching the recreational opportunity for county residents and visitors, while maintaining the unique character of the area. Wilderness solitude is an extremely valuable and fragile entity and once lost, it cannot be restored. Bean Lake, a notable exception for the area, is experiencing heavy, concentrated power-boat use, and recreational access is denied to many private holdings in the eastern end of the area because of conflicts with agriculture.

Potential:

This whole area can absorb more recreational use of a dispersed and primitive nature. Use of the wilderness can be increased, taking pressure off of overused wilderness tracts elsewhere, particularly in Area No. 1. The non-wilderness public lands have unutilized potential for general outdoor recreation, and there are also important potential recreational resources on private or leased lands where recreational access is granted or denied at the discretion of the landholder.

General Recommendations:

1. The underutilized potential of the wilderness tracts in this area should be publicized and otherwise made known to recreationists who may be presently overusing other areas. Perhaps additional trails and trailheads, better trail maintenance and signing, mapping, or simply spreading the word about the area's attractions could accomplish this end.

2. Restricting concentrations of recreationists to certain areas would minimize the impact.

3. More effective communication and cooperation between the landowner and the recreationist should be encouraged.

4. Should conflicts increase, motor boating on Bean Lake should be regulated or restricted.

Sun River - Augusta - Dearborn Area

Discussion:

Although this area's sweeping landscape could be termed prairie, it has none of the monotonous sameness and lack of topographic interest which many people associate with the term "prairie". It is an area as rich in landscape variability and scenic enclaves as any in Montana. The land is truly flat in only a few small areas, and most of the area is characterized by rolling hills and benches, rocky reefs, and frequent meandering stream basins of all sizes. Almost all of the area is covered with prairie vegetation or cropland, but there are generous stands of cottonwood and brush along the larger streams, providing habitat for whitetail deer and other valuable wildlife. There are also lakes and wetlands used by migrating waterfowl, and the fishing in many areas is quite good. The region has a long human history, as indicated by the plentiful Indian campsites, buffalo jumps, and the later abandoned homesteads and other signs of early ranching.

Problems:

For the most part, this area is a region that recreationists pass through on their way to someplace else, particularly the mountain areas to the west and the south; and thus the area's own recreation potential is easily overlooked. Areas such as buffalo jumps and other historic sites, streams suitable for fishing and floating, interesting hiking areas and scenic areas, and viewpoints along roads are not being fully appreciated for their potential recreational value. Also, almost all of the area is private or leased land and abuse by recreationists using this land has caused landowners to close their land and deny access. It is ironic that as the numbers of recreationists increase, the amount of land available for them to use decreases, mostly it seems, because of the recreationists' general lack of insight into the landowner's problems.

Potential:

This area could absorb considerably more outdoor recreation than it presently is; if landowner-recreationist conflicts are minimized, if steps were taken to make the area's historic, scenic, and water-based recreational facilities known and accessible to recreationists, and if small, minimally developed public picnic, camping, water access, and trail-head sites were made available throughout the area. Whether or not these steps are taken depends largely upon the wishes of the area residents. Increased recreational availability would enlarge the range of choices available to residents and visitors to the county, decrease the recreational pressure on other areas, and perhaps would contribute something to the local economy, but it also might lead to intolerable land use conflicts and a deterioration of the area's quality of life unless it were very carefully planned and regulated. At any rate, outdoor recreational pressure generally can be expected to increase in the area, and some steps should be taken to find ways of tolerating and channeling it, minimizing its adverse effects if nothing else.

General Recommendations:

1. Steps should be taken to discourage unregulated scavenging and collecting at historic sites, recreational home buildings, large vehicle campings, etc.

2. Restrictions should be made, so far as possible, for camping and picnicking in minimally developed public camping areas.

3. Specific steps should be taken to control vehicular recreation in the Willow Creek Reservoir area.

Lincoln - Blackfoot - Red Mountain Area

Discussion:

This mountainous, thickly forested sub-area is centered on the town of Lincoln and the Blackfoot Valley but contains large areas of designated wilderness and roadless country. Landscapes in this sub-area are quite varied, ranging from spectacular glaciated peaks to gently rounded hills and the flat valley floor with its magnificent ponderosa pines. There are several large streams which frequently offer good fishing, and hunting in the area is always excellent. The town of Lincoln is a popular jumping-off point for the vast wilderness to the north and is situated in the middle of a popular year-round outdoor recreational area. Recreational access is sometimes limited by private property conflicts but, as a whole, Area No. 5 is richly endowed with the raw material upon which outdoor recreational experiences are based.

Problems:

Area No. 5 is experiencing the beginnings of problems which are felt to a much greater degree in other sub-areas. There is some concentrated overuse of certain trails and campsites at the edge of the wilderness, but it is not yet as severe as that in Area No. 1; there are areas of landowner-recreationist conflict, but it has not reached the dimensions that it has in Areas 4, 7, and 8; and there are some areas where off-road vehicles have caused ecological damage, but it is not as widespread and intense as it is in Areas 10, 12, and 15. Access to recreational resource is a problem in some parts of Area No. 5. The Blackfoot River and excellent potential campsites and wilderness jump-off points are frequently cut off from the public by private land and prime potential recreational sites are sometimes lost to private large-lot subdivisions. As in other forested parts of the county, there is a general lack of signed trails, campsites, and public awareness of recreational possibilities in any areas except certain parts of the designated wilderness. This is tending to concentrate use in certain areas and along certain routes, leading to environmental damage and deterioration of recreational experiences. Some of the unique aesthetic features of the area are of a fragile nature, such as the magnificent ponderosa pines on the valley floor and the open undeveloped landscape vistas which can be enjoyed along the major travel routes crossing the area. In general, the most overriding problem in Area No. 5 is a general lack of public awareness of the many possible conflicts and problems stemming from the increasing recreational activity in the area.

Potential:

Area No. 5 has enormous outdoor recreational potential. There is ample room for the whole range of activities from the most primitive wilderness camping to the most hardware-intensive mechanized recreation. This enormous potential can be greatly diminished, however, if the increasing recreational activity is allowed to spread haphazardly over the landscape or if recreational forms which have very high individual impacts upon the landscape, such as recreational home-building, are allowed to lock up a disproportionately large share of the prime sites. The town of Lincoln may have much to gain from a careful allocation of the surrounding recreational resources, but much to lose, in terms of aesthetics and the unique quality of life which is prized so highly in the area, if recreational land use is allowed to increase in the coming years. Area No. 5 still has time to avoid the mistakes made by other fragile areas.

General Recommendations:

1. Such potentially harmful recreational forms may include off-road vehicle use and the establishment of summer recreational homes, as well as the environmental disruption associated with the development of major recreational sites such as ski areas and full-service travel trailer campgrounds. These recreational forms should be diverted to areas where their impact is least.

2. The recreational and aesthetic significance of the several major roads crossing the area should be realized, and the recreational attractions within these travel corridors should be maintained and enhanced where possible.

3. Certain recreational forms which have a high individual impact such as off-road vehicular use, summer home building, large-vehicular camping, and horseback riding in certain areas, should be regulated and diverted where necessary.

4. Nothing, however, should be done which would encourage any additional use of the facilities known to be overused, and use of the most severely damaged sites should be actively discouraged.

5. Alternate recreation opportunities should be made available to relieve pressure on existing over-used sites.

6. Desirable dispersion can be achieved by developing additional wilderness jump-off points and making additional roadside and trailside camping and picnic facilities available away from the over-used sites.

   The underutilized potential of this area should be publicized and made known to recreationists. All recreationists should be aware of all of the alternatives if he is to fully enjoy an area and to avoid over using a few well-known areas.

7. Ways should be found to provide outdoor recreational experiences for groups of people who are not yet enjoying it, such as elderly, handicapped, or otherwise immobile people. The emphasis here should be on making existing non-wilderness facilities more attractive or more available to these people.

8. The possibility of major recreational developments such as ski hills, dude-ranching, golf courses, or other sorts of resorts should be fully investigated. There are factors which indicate that the Lincoln area has significant potential for this type of development, and many possibilities could be investigated in the interests of the local economic base, quality of life, and the full utilization of outstanding recreational potential if the citizens of the Lincoln area so desire.

9. Unique and fragile aesthetic resources, such as the big pines on the valley floor, wetlands, and the habitat of rare wildlife should be protected from undue disruption.

10. Attempts should be made to acquire fishing accesses to the Blackfoot River along the Lincoln Valley.

East Slope - Rogers Pass - Upper Wolf Creek Area

Discussion:

Although this area is not as high and wild and scenically spectacular as some other areas, it has considerable potential as an outdoor recreational region, and most of this potential is not being appreciated at this time. Much of the area consists of rolling, readily-accessible forested mountains, although there is some steep wild country along the Continental Divide and the east slope in the northern part of the area. There are some dude-ranching operations in this area, and the Indians who formerly lived here have left behind considerable evidence, especially in the northern end of the area. There is good hiking and cross-country skiing here, particularly along the Continental Divide which is crossed by Highway 200, a major east-west recreational route, at Rogers Pass. In general, this area is lightly used with considerably overlooked potential.

Problems:

One of the main reasons why this area is generally underused recreationally is that there are many tracts of private land which, because of a history of abuse by thoughtless recreationists in the area, are closed to the public; thus access to many chunks of public land is difficult. Also, the public land management agencies have done little to encourage recreational use of their lands in areas where access is easy. The outdoor recreation which takes place in this area has developed mostly without facilities of any kind and is of a dispersed and thinly spread nature.

Potential:

A notable exception to the general lack of recreational facilities in this area is the dude-ranching which takes place here. These operations may very well set the tone for the kind of outdoor recreation which the area is best suited for: dispersed hiking, horseback riding, camping, rock climbing, picnicking, hunting, and off-road vehicle use. There is also potential for camping and picnic facilities or trail heads in certain areas, such as along Highway 200 (Rogers Pass in particular), or other existing roads, including Interstate 15 in Wolf Creek Canyon, which forms the southeastern boundary of the area. The gentle, rolling topography of many of the higher parts of the area is well suited for cross-country skiing and leisurely hiking, and the Continental Divide and historic Indian trails are readily accessible here. In general, this area can absorb considerably more dispersed outdoor recreation than it is presently subject to, and increased recreational use of the area could take some of the pressure off of nearby over-used areas.

General Recommendations:

1. This area is well suited for a wide variety of recreational forms and conflicts between competing forms can easily arise. Particular areas for cross-country skiing, snowmobiles, and off-road vehicles should be located and mapped.

2. Every available means should be utilized to educate recreationists about the limitations, restrictions, and options of using areas where private or leased land is interspersed with public land.

3. Attractive, easily accessible, minimally developed public camping and picnicking sites should be made available to recreationists. There is an almost total lack of such sites in the area now, and their presence would make the area available to many more recreationists and would tend to lift some of the pressure off of other over-used areas nearby.

4. Extensive trail systems should be established, signed, and maintained on public land throughout the area, particularly along the Continental Divide and in especially scenic or historic areas. Additional jump-off points for the Scapegoat Wilderness should be made available and publicized, assuring a more widely dispersed recreational use of this wild area.

5. Further efforts should be made to locate, evaluate, and to determine the recreational potential of the archeological sites within the area before direct unlimited recreational access is allowed to them.

Dearborn River - Stickney Creek - Beartooth Game Range Area

Discussion:

Much of this area is very mountainous and in some places the topography is extremely steep and rugged. Throughout all of this area the landscapes are quite variable, often beautiful, and always interesting. The Dearborn River and several smaller streams have cut meandering canyons through a bed of purple-gray volcanic rock, and elswhere the topography is frequently steeply rolling, broken in areas by steep crags, bluffs, and reefs of the same volcanic rock. In the southern part of the area, the land rises rather steeply above the Missouri River Canyon toward the crest of the Big Belts and the Gates of the Mountains Wilderness. Vegetation for the most part consists of ponderosa pine savanna, but there are small areas of unbroken forest and large expanses of rolling grassland. Color and shadow play a very significant role in defining the landscapes in this area, particularly near sundown or sunrise when the shadows are long and the colors of rock, water, and vegetation seem their most intense. Parts of this area are important game range, but mule deer, whitetail deer, and other species are found generally throughout the area.

Problems:

The major problems of this area all revolve around the fact that almost all of the area is private land, with access granted or denied at the discretion of the landowner. One large public area is the Beartooth Game Range, but here recreational use is restricted to protect the wildlife resource. Other small tracts of public land are leased for grazing and, at any rate, are usually quite inaccessible. The area does have significant recreational possibilities, but it appears that access will remain limited as long as recreationist-agriculturist conflicts persist.

Potential:

Disregarding the land ownership issue briefly, this area has fine potential for dispersed hiking, camping, picnicking, rock-climbing, hunting, and limited off-road vehicle use. Many scenic trails and viewpoints could be accommodated, and the Dearborn would be ideal for floating. The Beartooth Game Range area could serve as an alternate approach to the Gates of the Mountains Wilderness and, in general, dispersed outdoor recreation throughout this area could take some of the pressure off the Holter Lake area which has similar landscapes and problems and which is being overused. This area's unique recreational potential will not be realized, however, unless recreationists, landowners, and public land managers work together to minimize the serious recreation-agriculture conflicts.

General Recommendations:

1. Every available means should be fully utilized to educate recreationists about the limitations, restrictions, and options of using the recreational resources in this sensitive area. Mapping, signing, the publication of hand-out sheets and brochures, newspaper advertisements, or the available time on public affairs broadcasts could all be used to serve this end. A brochure or hand-out sheet distributed at all businesses or other places where recreationists are likely to stop might be an effective means of persuading the public and heading off potential conflicts.

2. There should be additional hiking trails and jumping-off points for the Gates of the Mountains area located in the Beartooth Game Range, if this can be done without threatening the wildlife resource.

3. The possibility of gaining some public recreational access to specific, valuable recreational resources which are located primarily on private or leased lands could be given by the landowner to well-behaved recreationists on some sort of permit basis. An example of an area which may have this kind of potential would be the Dearborn Canyon with its fine floating, backpacking, and camping potential.

4. In short, every available means of minimizing the agriculture-recreation conflict and of eliminating potential misunderstandings and hard feelings on both sides should be utilized. Better recreational land use might be the result of such a cooperative effort.

Holter Lake - Craig - Missouri River Corridor Area

Discussion:

This narrow corridor is subject to heavier and more concentrated recreational use than most parts of Lewis and Clark County. The Missouri River, a popular destination of recreationists, shares its narrow valley with Interstate 15, the major north-south travel route in this part of Montana. The combination of the two, together with the often spectacular scenery and the good hunting in the area, and combined with the great attraction of Holter Reservoir, creates a situation in which a large and ever-increasing number of recreationists are concentrated in a rather small area. The topography in this area is quite varied but consists largely of steep, and sometimes perpendicular, slopes enclosing the narrow floodplain and terraces of the Missouri River. The vegetation in the area is mostly ponderosa pine savanna and rolling grassland, but there are also areas of cottonwood and brush along the Missouri and its tributaries. There are also areas of hay and some low density urbanization on the valley floor. Most of the recreational use of this area is by residents of Cascade County, although people from Helena and other places througout a large region are also attracted to this area.

Problems:

Heavy and ever-increasing recreational use with its associated land abuse and land use conflict problems characterize this area. The intensity of outdoor recreation has long since increased beyond the point at which it could exist comfortably alongside the traditional agriculture in the area and is continuing to increase every year. The problem has been greatly intensified with the proliferation of various kinds of off-road and four-wheel drive vehicles, large camping trailers, power boats, and other kinds of hardware which enable recreationists to have a far greater individual impact upon the landscape than ever before. A recent trend has been the great increase in subdivision for seasonal recreation or retirement homes. Large and valuable areas are being lost to this extremely disruptive but disproportionately low density form of outdoor recreational development. In addition to the obvious aesthetic problems associated with recreational subdivision, there are problems of conflict with agriculture, the provision of county services, water pollution, conflict with wildlife, and a multitude of others. In general, the overriding problem faced by this area is that of coping with high and ever-increasing recreational pressure while minimizing recreational conflicts with agriculture and maintaining the quality of life in the area.

Potential:

This area's extremely high potential for water-based recreation, camping, picnicking, and off-road vehicle use is being fully utilized, and large numbers of additional recreationists cannot be easily accommodated unless the individual impact of each recreationist is decreased. The only alternative to this will be to accept rapidly increasing levels of resource abuse and recreation-agriculture conflicts, and a steadily decreasing quality of recreational experiences in the area, along with loss of aesthetic quality and deterioration of the rural quality of life in the area. At the present time, this area still has fine potential for a rich variety of high quality recreational experiences, but the point has been reached beyond which any large increase in the intensity of some recreational forms can only result in a loss of potential.

General Recommendations:

1. It must be recognized that in order to serve the large and ever-increasing number of recreationists which this area attracts while still maintaining the attraction, the individual impact of each recreationist should be kept at a minimum. Thus, certain recreational forms which have a high individual impact such as off-road vehicle use, large vehicle camping, horseback riding, power boat use and water skiing, and the establishment of seasonal recreational homes should be regulated and diverted where necessary. It may be necessary to eliminate these high impact, low density recreational forms altogether from certain areas and replace them with low impact, higher density recreational forms which will allow greater numbers of people to participate.

2. Outdoor recreational forms which are potentially incompatible with the practice of agriculture or the maintenance of agricultural land values in this area should be regulated and diverted to areas where their impact is slightest. Such recreational forms may include off-road vehicle use, unrestricted hiking and hunting, unrestricted camping, and the unregulated proliferation of seasonal recreation homes.

3. Every available means should be utilized to educate recreationists about the limitations, restrictions, problems, and options of using the recreational resources of this sensitive, heavily used area. Mapping, signing, the publication of hand-out sheets and brochures, newspaper advertisements, or the available time on public affairs broadcasts can all be used to serve this end. This effort can be directed primarily at Great Falls and Helena, the two areas where most of the recreationists come from.

4. Nothing should be done which would encourage the additional use of recreational facilities which are already close to being overused.

5. Additional steps should be taken in this area to provide passive recreational opportunities for groups of people who are not yet enjoying them such as elderly, handicapped, or otherwise immobile people, whether they live in the area or in the nearby population centers. There are many existing facilities which could be used for this purpose.

6. The possibility of utilizing specific kinds of recreation potential which have been overlooked in this area should be investigated. Facilities such as short scenic hiking trails, bicycle trails, etc. might prove to be very desirable additions to the recreational opportunities in the area.

7. The very high scenic quality of the Interstate 15 visual corridor should be protected from further deterioration if possible. The same could be said for the land areas clearly visible from the river and from Holter Lake. Interstate 15 from Helena to Great Falls affords one of the most outstanding, best known, and frequently travelled scenic drives in Montana, and this great scenic resource may be lost to such things as unrestricted rural subdivision in the visual corridor.

8. Given the area's special problems and potentials, a much more intensive and comprehensive recreational planning effort should be directed toward this area. All of the landowners, all of the professional land management agencies with an interest in the area, and representatives of all the recreationists who use the area should be involved in this effort.

9. The potential exists for some additional boat-access camping along the Missouri River between Holter Lake and the Gates of the Mountains, but any further recreational development in this area must be very carefully planned to not aggravate existing problems. Road-served access points on the lake shore must be improved to handle the additional traffic, and motor boat use must not be allowed to cause undue additional wave erosion on the steep banks of this highly scenic canyon.

Gates of the Mountains - Canyon Ferry - Missouri River Corridor Area

Discussion:

This narrow corridor is probably one of the heaviest used recreational areas in this part of Montana. Canyon Ferry Lake is a regionally popular recreational attraction, and the spectacular Gates of the Mountains is one of the best known landmarks along Lewis and Clark's original route. The area has so far managed to tolerate high levels of recreational pressure without suffering landowner-recreationist conflicts as severe as those in some other areas; and despite the frequently heavy and concentrated use, the basic resource has not been badly mistreated in most of the area. Canyon Ferry Lake is the largest body of water in Lewis and Clark County, and the entire chain of lakes is extremely popular for all kinds of water-based recreation. Landscapes along the shore are frequently steep and rugged, and sometimes truly spectacular, as in the Gates of the Mountains area, and the shore line areas are very popular with hikers, campers, picnickers, and off-road vehicle users. Vegetation along the shores consists primarily of ponderosa pine savanna, although there are areas of continuous forest of douglas fir and pine and some areas of rolling grassland. There are stretches of river which offer outstanding fishing, and the shoreline areas are home to many kinds of wildlife.

Problems:

This area has the usual set of problems associated with heavy use. There is some wear and tear on road side strips, popular campsites, and on the general landscape where it is accessible to off-road vehicles. Popular parts of the lakes and the shorelines are sometimes quite crowded, and it is possible that some popular areas may not be able to absorb additional high impact recreation without suffering deterioration. There is a real danger that valuable easily accessible water-side property with fine recreation potential will be lost to low density high impact uses like seasonal home building. Aesthetic deterioration is occurring in some areas, caused by off-road vehicle use and haphazard road side and water side development, and the establishment of seasonal homes and other developments in highly visible locations. Finally, access to some areas is complicated by rugged topography and property conflicts, which tend to concentrate heavy use on relatively few accessible sites.

Potential:

This area has great recreational potential and, although much of this potential is being utilized now, the area still offers many recreational opportunities which are underestimated or ignored. As a whole, the area can absorb more outdoor recreation than it is presently accommodating, and it is expected to feel much additional pressure given its proximity to Helena and to major highways, and the increasing population of the large region from which it attracts recreationists. In addition to various types of boating and fishing for which the area is well known, it has fine potential for hiking, rock-climbing, camping, picnicking, etc., and for more passive kinds of recreation like sight-seeing and nature study.

General Recommendations:

1. In order to accommodate the large and ever-increasing numbers of recreationists which this area will continue to attract, the individual impact of each recreationist should be kept at a minimum. Thus, certain outdoor recreational forms which have a high impact on the resource while giving enjoyment to relatively few people should be regulated and diverted, when necessary, to areas where their impact is least. These recreational forms may include off-road and off-trail vehicle use, power boat use and water skiing, large vehicle camping, seasonal home building, and horseback riding in fragile areas. A highly disruptive but low density recreational land use such as recreational homesite subdivisions should not be allowed to take a disproportionate share of the prime recreational sites in this extremely popular area.

2. A special effort should be made by the public land management agencies, working in cooperation with local government and landowners, to identify and catalogue the sites in the area which have the most potential for heavy outdoor recreational use. These sites should be managed for their best recreational use and not lost to inappropriate use. A comprehensive management and/or acquisition plan should be developed by all of the agencies, groups, and individuals having an interest in the area.

3. Private landowners in the area should fully investigate the possibility of developing profit-making recreational facilities of various types on their own land, where the land has potential for recreational use. Such developments should be fully compatible with an overall areawide facilities network in order to best serve the largest number and full range of recreationists.

4. Recreational forms or concentrations which are potentially incompatible with the maintenance of vegetation, wildlife, slope or soil stability, or aesthetic quality should be discouraged in all areas except those areas where their impact is the least. These recreational forms may include off-road and off-trail vehicle use, large vehicle camping, and the building of recreational or seasonal homes.

5. Efforts should be made to expand the range of recreational opportunities offered by the area. The area's full potential for hiking, rock-climbing, backpacking, and off-road camping should be realized. Scenic trails and associated viewpoints could be located here, as could a network of backcountry campsites far away from areas where vehicles are used. Bicycle trails could perhaps be established as well as additional road-side picnic areas, etc. Steps should be taken to make this area available to groups of people who are not now enjoying it, such as elderly, handicapped, or otherwise immobile people, particularly those from Helena. Additional facilities for passive recreation are needed for the elderly and others.

6. Steps should be taken to identify, locate, and evaluate any unique, rare, or fragile vegetation, wildlife, Indian artifacts, ruins, geologic features, etc., and protect them from vandalism, collecting, and other abuse, and to perhaps emphasize them as recreational attractions.

7. Private landowner-recreationist conflicts must be minimized. Every available means of informing recreationists of the special problems, obligations, and options of using areas in which private land is located should be fully utilized, such as hand-out sheets and brochures, newspaper space, and the time available on public affairs broadcasts.

Granite Butte - Upper Little Prickly Pear - Marysville Area

Discussion:

Although it straddles the Continental Divide, the mountains in this area are not as rugged and spectacular as they are in some other parts of the county, and the area offers little of the wilderness which is characteristic of the Continental Divide country further north. However, the area is very rich in outdoor recreational potential, much of it underutilized and almost all of it completely undeveloped. Much of the early gold mining activity in Lewis and Clark County took place in this area, particularly in the Marysville vicinity, and despite the ravages of time and vandals, many signs of this exciting era still remain. The Continental Divide is easily accessible and easy to cross here, and there are several passes made famous not only by the gold miners, but earlier explorers and the Indians before them. There are also caves, other unique natural areas, and a few roadless back-country areas of considerable interest. Vegetation is primarily forest of douglas fir and lodgepole pine, much of it second growth, but there are also considerable areas of quaking aspen, which are beautiful at all times of the year, and stands of ponderosa pine, brushlands, and rolling grasslands in the eastern part of the area. The dry Scratchgravel Hills which dominate the northwestern part of the Helena Valley are covered with ponderosa pine savanna. A great variety of wildlife occupies the wide range of habitats found in the area, including almost every species found in the county.

Problems:

The considerable recreational potential of this area is being underutilized and in some cases misused. The area is crisscrossed with roads, but there are no established campgrounds or other developed summer recreational destinations. There is also no protection for the many early mining buildings, cabins, and ghost towns which are falling prey to collectors of bottles, "barn board", and others odds-and-ends. The large buildings of the famous Drumlummon Mine were recently destroyed by fire, and many historic features of the area are easy prey to vandals. The area presently absorbs much outdoor recreation of a casual and unregulated nature, and this is widely dispersed by the many roads. Off-road and off-trail vehicles are causing damage in some areas, and landowner-recreationist conflicts are developing in a few places. Recreational access to public land is complicated in some areas by a maze of old mining claims and other private holdings. This is particularly true of public land in the Marysville area, where an area with fine recreational potential is riddled with old mining claims, many of which are no longer worked or active. In short, this area is beginning to suffer from haphazard and unregulated patterns of outdoor recreation, and the area's considerable potential may be greatly diminished before it is fully appreciated.

The south and east portion of the Scratchgravel Hills area has given way to residential homes. Access roads in many cases are improperly placed giving rise to soil erosion and dust pollution.

Potential:

This area is very close to Helena and is served by several good roads. This, combined with the beauty, easy internal accessibility, historical interest, and wildlife in the area makes it a popular destination for Helena-based recreationists. This area could easily absorb much more outdoor recreation than it is presently tolerating, if steps are taken to regulate it, minimize potential land use conflicts, and to provide recreational facilities of many kinds. Campgrounds, picnic areas, trail systems, scenic viewpoints, and a wide range of other features should be established here. The old mining areas could become history-oriented recreational attractions of considerable interest and significance. All things considered, this area could become a very important dispersed recreation area for Helena, county, and regional residents and could absorb much more recreation than it is presently handling. It could also tolerate a much wider range of kinds of activities than it is presently providing. In order for this full potential to be realized, however, several additional kinds of facilities will have to be made available, and the area's fragile recreational resources must be protected.

General Recommendations:

1. Recreational forms which are potentially incompatible with the maintenance of the area's fragile recreational resources should be regulated and diverted, when necessary, to areas where their impact is minimized. The area's fragile recreational resources include the old buildings and other signs of early mining activity, any caves or other unusual natural areas, vegetation, particularly on steep slopes, wildlife habitat, and the quality of water. Recreational forms which are potentially incompatible with one or more of these things include collecting and scavenging in the old mining areas, off-road and off-trail vehicle use, the building of seasonal recreation homes, and, in some cases, large vehicle camping.

2. Parts of this area can tolerate off-road and off-trail vehicle use, and, in fact, this is the only sub-area near Helena which can absorb considerable recreation of this kind. It is, therefore, recommended that defined areas should be established for motorcycle and trail bike use, snowmobile use, etc. Parts of the area are quite well suited for these kinds of mechanized recreation, and their use should be encouraged to take the pressure off of other, more fragile, areas.

3. The potential for serious landowner-recreationist conflicts must be recognized, and recreational forms or concentrations which are potentially incompatible with agriculture, active mining, or other legitimate private land uses should be carefully regulated in areas where conflict may occur. Every available means should be utilized to inform recreationists of their responsibilities, options, and obligations when using areas in which private land is encountered. Proposals for any recreational developments such as trails, campgrounds, or off-road vehicle areas should take the landowner-recreationist conflict potential into account, and it is strongly recommended that landowners play an active role in any further recreational facility planning in this area.

4. Every available means should be investigated to improve the recreational usability of public land within this area. Reasonable access should be assured to these lands, and public land use agencies should investigate the possibility of buying and trading lands or easements in order to assemble their holdings into units of sufficient size and continuity to be effectively managed for recreation. This is especially important in areas where large numbers of inactive mining claims are found.

5. Outdoor recreation should be dispersed throughout the area. The existing road system could perhaps be improved, and an extensive trail system should be established with associated campsites, viewpoints, etc. Special-use trails such as historic or nature trails could be set up in areas where an especially interesting historic or natural feature exists.

6. There is a real need for campsite and picnic area development. These could be scattered, minimally developed, user-maintained sites, or more fully developed and maintained campgrounds and picnic grounds located in strategic places, like the Marysville area. A combination of both kinds of sites might prove the most useful.

7. Every effort should be made to locate, inventory, evaluate, and protect the large number of historic sites still remaining in this area. Steps must be taken to protect the old mining buildings and cabins, for example, or they will soon be gone.

8. Parts of this area are extremely well suited for cross-country skiing and snowmobiling. These areas should be identified and steps taken to encourage and regulate winter recreation within them. Conflicts between snowmobilers and cross-county skiiers must be avoided, and the only way to do this is to regulate and separate these recreational forms. Cross-country skiing trails could probably tie in somehow with the existing Mt. Belmont Alpine ski area, but snowmobile use should not be allowed to interfere with the enjoyment of either alpine or cross-country skiing.

9. The underutilized recreational potential of this area should be publicized and made known to recreationists. Recreationists should be fully aware of all of the options this area has to offer if they are to fully appreciate the whole range of its potential and not just a few popular overused sites.

10. Steps should be taken to make the recreational resources of this area available to people who may not now be enjoying them, such as elderly, handicapped, or otherwise immobile people.

11. The residents of Marysville should fully investigate the recreational potential of their historic old mining town. Marysville has great historic interest and fine potential as a year-round recreational area. As yet, little of this recreational potential is being utilized. There are no camping, picnicking, or designated hiking areas, or facilities for most other kinds of outdoor recreation, and the old buildings are crumbling. Winter recreation in the area could also be expanded, given Marysville's reliable snowfall and easy access from Helena.

Rattlesnake Mountain - Hilger Valley - Little Prickly Pear Creek Area

Discussion:

This dry, hilly area is entirely dominated by a few large ranches, and despite the facts that it is crossed by a major north-south highway and two other good roads and is quite close to Helena, it has been subject to relatively little outdoor recreational pressure, other than some fishing in the Little Prickly Pear and other recreation allowed by the landowners.

This area is a region of rolling hills covered mostly with grasslands. There are few trees, except for stands of cottonwood along Little Prickly Pear Creek and some ponderosa pine savanna in the hills. This is one of the driest areas in the county and the vegetation reflects this. Landscape quality is generally excellent, especially as it is seen along Interstate 15. It is a very pleasant and interesting area to travel through. The scenic integrity of the high, rolling rangeland and savanna, visible from the highway, has not been broken down by inappropriate land use, and this is another segment of the fine scenic corridor along Interstate 15.

Problems:

From the point of view of recreational use, this area has no serious problems. The amount of outdoor recreation presently allowed by the landowners seems appropriate, given the dominance of agriculture in the area and the area's limited recreational potential. Additional amounts of recreation would eventually lead to recreationist-landowner conflicts similar to those already experienced in other areas where agriculture is also dominant. The recreational potential in the area is also quite limited and, even if the area were public land, it would not be able to accommodate or tolerate much additional use. The aesthetic quality of the landscape, while still intact, is quite fragile, particularly along Interstate 15 in the Hilger Valley and McLeod Basin areas, and the open, highly-visible landscapes could very easily be disrupted by development.

Potential:

This area has relatively little outdoor recreational potential, and this potential is probably being utilized at this time. The area can tolerate widely dispersed hiking, camping, picnicking, etc., and some hunting, as well as fishing along the stream, and these activities, at their present levels, do not seem to be conflicting with agriculture. Other activities such as limited off-road vehicle use could probably be tolerated here, if it were not for the great potential conflict with agriculture. In general, this area should be left alone as far as outdoor recreation is concerned.

General Recommendations:

1. Nothing should be done which would encourage much additional recreational use of this fragile area, unless such action is initiated by

the landowners themselves. Recreationist-landowner conflicts must not be allowed to develop.

2. Every reasonable means should be utilized to inform recreationists who may wish to use this area of the responsibilities, options, and hazards of using an area dominated by agriculture. This area can be used to its full, if limited, recreational potential if all recreationists respect the interests of agriculture.

3. The high scenic quality of the Interstate 15 visual corridor should not be allowed to deteriorate. The fragile nature of the landscapes in this area should be recognized, and any proposals for land use changes should take the scenic factor into account.

Sleeping Giant - Copper Butte Area

Discussion:

The topography of this area ranges from gently rolling hills covered with ponderosa pine savanna to very steep and rugged country, including Wolf Creek Canyon and Beartooth Mountain, or the "Sleeping Giant," a well known landmark to Helena residents and the home of bighorn sheep and mountain goat populations. The area is situated between Interstate 15, the major north-south traffic route in west-central Montana, and the Missouri River, the major recreational attraction in the region. Thus its location alone makes it an area of significant recreational and scenic importance. Wolf Creek Canyon is a well known and highly regarded scenic corridor, and the rugged Beartooth Mountain uplands towering over the Gates of the Mountains constitute a compact and popular area for hiking, rock-climbing, and big game hunting. The rolling area between Copper Butte and Black Sandy Beach, which is adjacent to the north end of the Helena Valley, is a popular off-road vehicle area and is frequently used for hiking, camping, hunting, and picnicking by Helena residents. All in all, this is a very interesting area scenically, topographically, and ecologically, and has interesting recreational potential.

Problems:

Accessibility to and within this area is limited in some places by steep topography and by private property conflicts. There are rather large holdings of public Bureau of Land Management land, but these are usually situated in a checkerboard pattern with private land or otherwise separated from public access by private holdings. In some places, particularly in the hilly southern part of the area, heavy and concentrated use of off-road vehicles is causing damage to vegetation, soils, and slope stability. The spectacular scenery visible from the highway and the river could easily be damaged by inappropriate land uses. So far this has not happened in this particular area, but the outstanding landscape quality could easily be degraded.

Potential:

This area could absorb more outdoor recreational activity than it is presently handling and could probably help relieve some of the heavy recreational pressure along the Missouri River corridor, particularly if ways were found to better utilize the public land for recreational purposes. Much of the area has good underutilized potential for backpacking, camping, picnicking, etc., and outstanding potential for scenic trails, viewpoints along the highway, rock-climbing areas, short educational or nature trails, and other recreational facilities depending upon dramatic, highly variable, but specially compact landscapes. All things considered, this is a very interesting area and certainly merits additional study.

General Recommendations:

1. Recreational forms which are potentially incompatible with the maintenance of the outstanding scenic quality of the Interstate 15 corridor should be reevaluated and diverted to areas where their impact is minimized. This would also be true of the areas visible from the river, lakes, and the Gates of the Mountains wilderness across the river.

2. In general, outdoor recreation should be dispersed throughout the area, providing that private property conflicts and scenic environmental damage are avoided.

3. Every available means should be utilized to educate recreationists about the limitations, restrictions, and options of using this area in which private agricultural land is interspersed with chunks of public land. Recreational land use conflicts are easy here and if the public land with its considerable recreational potential is to be fully utilized, then steps must be taken to protect the agricultural interest on the private land.

4. Other means of better utilizing the public land in this area should be investigated by the public land management agencies involved. Such means might include the purchase of land or access rights, the leasing of additional land or certain rights to it, or trading of parcels of land in order to gain better access, gain the lands with the highest innate recreational potential, or to put together land units of sufficient size to be economically managed for recreation. Private landowners should also investigate the possibility of using some of their land in prime areas for compatible public recreational "fee" use.

5. Recreational sites and facilities developed to some degree should be provided in this area. These would include campsites, picnic sites, and perhaps scenic viewpoints along the highway. This area has outstanding potential for short and intermediate-length scenic trails, as in the Wolf Creek Canyon and Sleeping Giant areas, short educational and nature trails, or other sorts of interpretive facilities, and these should be investigated. An extensive trail network

with scattered, minimally-developed, user-maintained campsites might be a possibility, providing land use conflicts are minimized.

6. The use of off-road vehicles is not necessarily incompatible with much of this area, and their use should be allowed to continue in the southern part of the area; however, such use should be regulated and diverted when undue damage occurs to soils, vegetation, slope stability, wildlife stability, or agricultural interests in the area. Steps should be taken to inform the mechanized recreationists of the potential abuses and associated responsibilities of their sport.

7. In general, increasing outdoor recreation seems to be a major factor in the future of this area because of its location and its innate potential. All steps should be taken to guide and regulate this increase in recreational use so that it can be accommodated without conflicts and abuse to the land or to other claims upon the land. Agriculture, fragile game range, and equally fragile scenery should all be protected.

Meriweather Canyon - Hogback - Trout Creek Area

Discussion:

This area has some of the most fascinating and spectacular topography in Lewis and Clark County. The massive limestone peaks of the Big Belt range overlooking the Helena Valley can be appreciated at a distance; but the true abundance and variety of interesting landscapes of all scales can only be known by exploring the area's roads and trails and by a considerable amount of off-trail hiking and rock-climbing. Several small streams have carved deep and, in some cases, perpendicular-walled canyons in the limestone. Above these gorges are hanging valleys and ridge-top meadows full of wildflowers. Much of the area is covered with forests of douglas fir and ponderosa pine, but since this area is drier than many other mountain areas in the county, there are considerable stretches of open grassland and savanna. The area is the home of many kinds of wildlife including elk, mule deer, black bear, mountain goat, cougar, etc., as well as a great many other species.

Problems:

This area is a popular destination for Helena-based recreationists, but recreational use is concentrated in certain small areas. Popular camping areas, popular trails such as the Refrigerator Canyon trail at the entrance to the Gates of the Mountains Wilderness, and roadside areas are being grossly overused while many suitable alternative areas are scarcely being used at all. Refrigerator Canyon, for example, has almost been ruined by foot and horseback traffic while alternative routes into the wilderness have not been used. Most of the area has not suffered severely from off-road vehicle abuse, but fragile areas accessible from the Figure-8 road could easily be damaged. In general, the outstanding potential for dispersed recreation in much of this area is not being realized, while small parts of the area are being grossly overused. Signs of this overuse include loss of vegetation, damage to soils and slope stability, and a general deterioration of recreational attractiveness. Finally, access to many areas is difficult because of topography, and water for drinking is lacking in many places. The area is generally drier than most other mountain areas in the county.

Potential:

Almost all of this area has excellent, underemphasized potential for dispersed hiking, camping, rock-climbing, picnicking, etc. Many areas could tolerate additional recreational pressure, thus taking some pressure off of the overused and abused areas. This area's attractions, easy access, and proximity to Helena all indicate that it will continue to be a popular area for Helena residents, and it must be expected to absorb increasing recreational use in the future.

Helena Valley - Spokane Hills Area

Discussion:

This area consists of the almost flat floor of the Helena Valley and the bench and foothill areas adjacent to the east and the southeast. It includes the urbanized area north of Helena as well as large tracts of irrigated and non-irrigated farmland. Except for the Spokane Hills, the area is generally lacking in topographic relief but it affords a full circle of magnificent views of the mountains in adjacent areas and in two adjacent counties. Thus the major scenic asset of this area is not really the intrinsic quality of the landscape contained within its borders, but rather the open, sweeping, gently concave terrain which allows clear views in every direction beyond its borders. This area is not lacking in scenic and recreational features, however. Scenically, it has the open pastoral nature of most traditional farming country in Montana with grazing areas and cultivated fields, interrupted by stands of cottonwood and brush along the watercourses, and punctuated by occasional farm buildings. This landscape is being increasingly altered by urbanization, but its basic character is still intact in most places. Recreationally, the area has always invited horseback riding, picnicking, off-road vehicle use, limited fishing and hunting along the streams, in marsh areas and in the Spokane Hills, ice skating and fishing on the shallow lakes, and passive sight-seeing. This area contains some important wildlife areas. The marshes around Lake Helena are nesting areas for a great variety of birds, including the great blue heron, and there are also a few prairie dog towns and some whitetail deer habitat.

Problems:

The area's recreational problems stem from its increasing rate of urbanization. The influx of new development is putting pressure upon the area's pastoral amenity and wildlife areas and is, at the same time, creating the need for additional recreational facilities of an urban type, such as playgrounds, playing fields, and the other facilities associated with an urban park. The fragile and somewhat scarce potential recreational assets of the area are in real danger of being lost before their full potential is realized. Urbanization in the area is following a familiar pattern of not taking existing aesthetic or recreational features into account, assuming they will always be there, until at some point they have deteriorated beyond repair.

Potential:

This area will probably never have the kinds of recreational features which will attract large numbers of people from outside of the area, unless they are major man-made developments such as the county fairgrounds, motorcycle and stock car tracks, or other user-oriented type sites. The primary concern for this area should be to use the existing natural amenity to meet the recreational needs of the area residents and moderate numbers of people from Helena.

Mount Helena - Unionville - Red Mountain - Upper Tenmile Area

Discussion:

This small, mountainous area is very important to anyone who has spent much time in or near Helena. The city owes much of its urban appeal to the close proximity of, and delightful backdrop provided by, the mountains to the south and southwest. The older sections of Helena are draped over the steep foothills of these mountains and are crowded up between them which, when combined with the architectural exuberance of the early hillside buildings, contributes enormously to Helena's urban amenity and unique character. Recently, the benefits of hillside living seem to have been rediscovered, as Helena again is expanding into piney hills, posing certain problems while enhancing the city's character.

There is a very wide range of recreational environments encountered within a very short distance as one travels southwestward from Helena. The central business district and urban renewal area are immediately adjacent to Mount Helena, which is essentially a natural, relatively undisturbed area, and to several steep walled gulches with a long and rich human history. Immediately beyond these lightly developed areas, the landscape acquires the character of undisturbed forest and there are recognized roadless areas within a few miles of town. Further out additional early mining areas are encountered, as well as a great many other interesting features.

Most of this area is characterized by the rolling mountains of the Boulder Batholith, with occasional valleys, narrow gulches and canyons, and many interesting rock formations. Dominant vegetation consists mostly of douglas fir-lodgepole pine forest, with ponderosa pine woodland and savanna on the drier sites. Many kinds of wildlife inhabit the area, notably cougar, black bear, elk, mule deer, a great many smaller species, and even moose in the southwestern part of the area.

Problems:

This area's major problems as well as its potential stem from the fact that it is immediately adjacent to a growing city. There is a considerable amount of damage caused by off-road and off-trail vehicles near Helena and in any readily accessible area. There is a hundred-year accumulation of garbage, scrap, and litter in some gulches near town, and valuable trees and old buildings have suffered considerably from vandalism. Bottle collectors and "barn-board" hunters, as well as vandals, are now threatening what is left of the abandoned mining settlements. Parts of the area show the scars of past man-caused fires, overgrazing, wasteful mining and logging practices, and other damaging land use activities. Recently, rural subdivision and recreational home building have spread into many of the most scenic and easily accessible areas.

Not the least of the area's problems is its almost total lack of any sort of planned recreational facilities. The Mount Helena Park, one of the largest municipal parks in the United States, has never been managed as a park and has fallen victim to vandalism, fire, and damage from vehicle use and other unregulated recreation. It is unlikely that the majority of Helena residents are even aware that Mount Helena is indeed a city park. Except for the Mount Helena Park, there are almost no planned trails, campgrounds, picnic areas, or other planned and maintained outdoor recreational facilities in this area, except in the Moose Creek area 15 miles from Helena. The large amount of recreational activity, which intensifies as one gets closer to Helena, is almost entirely of a haphazard and unregulated nature, resulting in considerable damage to the recreational resource and a continuing loss of recreational opportunity and aesthetic quality of the landscapes.

Potential:

This area has outstanding and mostly unutilized potential for outdoor recreation. The strikingly abrupt transition from Helena's central business district to the historic undeveloped land immediately to the south and the west, much of it publicly owned including the Mount Helena Park, presents a unique and wonderful opportunity to tie a wide range of wildland park facilities directly to a renewed urban core. Beyond the Mount Helena Park, the rest of the area has excellent potential for dispersed camping, hiking, picnicking, bicycle riding, sightseeing, rock-climbing, cross-country skiing, horseback riding, and, in some areas, trail bike and snowmobile use. There are several places within a short distance of Helena where camping or picnic grounds with associated trail-heads or other recreational facilities could be established.

In general, all of this area could tolerate a sort of loose-knit wildland recreation complex tied together by various kinds of trail systems with camping, picnicking and other kinds of facilities at key points. The complex would become more and more widely dispersed as one got further from Helena, and existing undisturbed roadless areas could be left entirely alone except for the maintenance of a few foot trails. Where this area merges with Helena, starting points for several kinds of trails, as well as other kinds of recreational facilities, could be located at the fringe of the urban renewal area, resulting in a smooth continuum from a strictly urban park situation to a roadless area situation within a few miles. All things considered, this area has an exciting outdoor recreational potential.

General Recommendations:

1. Outdoor recreational forms or concentrations which are potentially incompatible with the maintenance of the area's outstanding scenic quality and other recreational resources should be regulated and diverted when necessary. More specifically:

   - All use of motorized recreational vehicles should be eliminated in Mount Helena Park and on all hillsides adjacent to or visible from Helena and the use of these vehicles should be closely regulated in all parts of the area.

   - Collecting and scavenging in abandoned mining settlements or other historic sites should be eliminated so that these areas can be evaluated for their recreational potential.

   - In any areas where concentrations of casual and unregulated hiking, camping, or other outdoor recreation is resulting in damage to soils, vegetation, or slope stability, such recreation should be regulated and diverted elsewhere if necessary.

2. Management of outdoor recreation in this area should be directed toward a goal of serving the largest number of Helena-based recreationists who can be accommodated without deterioration of the resource or of recreational experiences. It must be recognized that in order to accomplish this goal, the individual impact of each recreationist should be kept at a minimum. Thus certain recreational forms which have a high individual impact such as off-road vehicle use, seasonal home building, large vehicle camping, horseback riding in fragile areas, and collecting and scavenging should be closely regulated and perhaps eliminated from parts of the area, particularly the area near Helena.

3. A concentrated and cooperative effort is now underway to plan and develop the city-owned Mount Helena Park, to maximize the scenic and recreational benefit of this park for the citizens of Helena.

4. A fairly wide range of planned and maintained outdoor recreational facilities should be established throughout this area. These developments should include:

   - An expanded network of foot trails tying together all parts of the area. These trails should be designed to enable hikers to fully enjoy the area's scenery and viewpoints, historic sites, roadless areas, and to connect with camping and picnic areas, access points, and Mount Helena Park.

- Other kinds of trails, particularly equestrian trails and marked cross-country skiing routes. The area has fine potential for these kinds of systems.

- Reserved trail-bike or snowmobile areas. There may be places within the area where motorized recreation can take place without conflict. These recreational forms should not be given high priority in this area, however, and it may be advisable to discourage their use altogether.

- Overnight camping areas. These should range in level of development from small, minimally-developed, user-maintained campsites scattered along the trail system to a few more rather large multi-purpose grounds similar to existing Forest Service campgrounds. Good locations for these kinds of developed campgrounds would be the Nelson Gulch and Unionville-Park City areas.

- Day use picnic areas, again ranging from small scattered minimally-developed sites to larger multi-purpose sites perhaps in association with the campgrounds. The Mount Helena Park and other areas near Helena would be fine locations for these sites.

- Various kinds of interpretive facilities, especially in connection with historic sites, unusual natural areas, and scenic view points. These facilities may include signs, short trails, etc.

- Other kinds of recreational facilities which should be in keeping with the overall recreational character of the essentially natural, dispersed-use area which must absorb heavy recreational pressure from the City of Helena.

5. An effort should be made to inventory, evaluate, and maintain the many historic and cultural sites within the area. Many of these sites have potential for enriching the range of leisure time activities available to Helena residents and visitors to the Helena area. This is particularly important in the old mining areas near Helena.

6. Every means should be investigated for extending the recreational opportunities offered by the area to groups of people who may not be now enjoying them, such as elderly, handicapped, or otherwise immobile people. New facilities should be designed with these groups in mind, and ways should be found to allow these people to enjoy more of the area's existing amenity and facilities. Something as simple as a regularly scheduled bus ride for the elderly to a scenic picnic area would serve this end.

7. Every available means should be investigated to improve the recreational usability of all public land within the area. Reasonable access should be assured to these lands, and public land use agencies should investigate the possibility of buying and trading lands and easements in order to assemble their holdings into units of sufficient size and continuity to be effectively managed for outdoor

recreation. This is especially important in areas where large numbers of inactive mining claims and other small private holdings are found.

8. Every available means should be utilized to inform recreationists of their responsibilities, options, and obligations when using areas in which fragile natural or historic features are found, or areas in which private land is likely to be encountered. Proposals for any recreational developments should take the landowner-recreationist conflict potential into account, and it is strongly recommended that landowners play an active role in any further recreational facility planning in this area.

9. Finally, it must be emphasized that good outdoor recreation planning and management in this complex area can only be achieved through open cooperation and coordination among several public agencies, including the Conservation District, Forest Service, Bureau of Land Management, State of Montana, Lewis and Clark County, and the City of Helena, working with the private landowners and other citizens of the surrounding area.

RECREATION GOALS AND OBJECTIVES

Primary Goal

The Conservation District, in presenting information on a variety of recreational landscapes, recognizes that we have an opportunity for a rich variety of outdoor experiences and that these experiences are a necessary ingredient for a desirable quality to our life.

The purpose of long-range planning in Lewis and Clark County is to assist the Conservation District and others in making sound decisions that maintain and enhance our quality of life through good recreational land use decisions.

One goal is to assure that maximum opportunity for an optimum variety of outdoor recreational experiences for all segments of the county population and for visitors to the county is available.

Objectives:

- To determine as accurately as possible and respond to the recreational needs, desires, and expectations of the following groups of recreationists:
    - County-based recreationists
    - Regionally-based recreationists (neighboring counties or all of Montana)
    - Out-of-staters
    - Handicapped, elderly, or otherwise disadvantaged people
    - All age groups

- To assure that man-made outdoor recreational facilities throughout the county are of sufficient quantity and quality to meet minimum standards set up to protect public health, safety and welfare.

- To do all that is possible to assure a continuing balance between reasonable access to recreational lands and private property rights and privileges.

- To identify and do all that is possible to correct any inequalities in the social distribution of the outdoor recreational opportunities in Lewis and Clark County.

Resource Goal

One of our goals is to assure that the entire existing and potential recreational resource of Lewis and Clark County will be dealt with as a whole, and that this resource will be allocated in such a way as to best maintain or enhance its value and richness.

Objectives:

- To determine the full potential as well as the limitations of the entire outdoor recreational resource within Lewis and Clark County, and to relate these potentials and limitations to existing and anticipated demand for the recreational resource.

- To identify and do what is possible to protect or enhance those natural areas, features, processes, or occurrences which set the tone or define the nature of outdoor recreational experiences within Lewis and Clark County.

- To determine the relative value of the county's recreational resource in the local, regional, statewide, and nationwide contexts and do what is possible to allocate the resource accordingly.

Management Goal

The management goal is to to assure the optimum level of communication and cooperation among all of the agencies, groups, and individuals who manage or use the recreational resource in order to assure the most efficient and least wasteful allocation of the resource and the most creative and innovative management.

Objectives:

- Because of the multiplicity of land ownership and management within the county and because of the various recreation planning efforts already under way, we should work to insure the most effective level of communication and cooperation among the following:

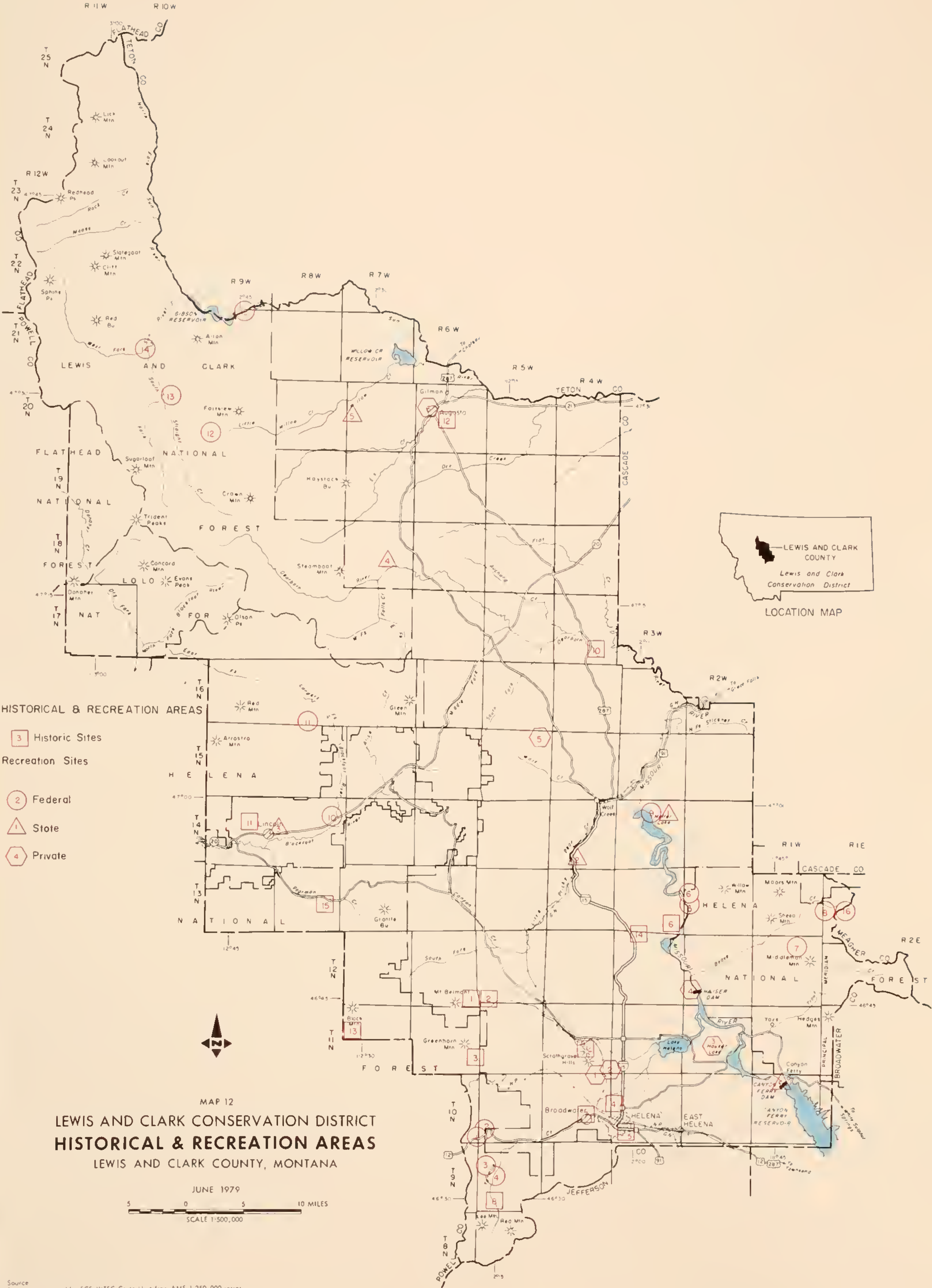
    - All of the professional land management agencies in the county
    - Other various governmental agencies
    - Landowners
    - All recreationists, county-based or otherwise

- Establish a lasting framework for continuing formal or informal communication and cooperation among the above-mentioned groups. Assure the survival of an organized means for sharing data and coordinating work.

- Provide lasting procedures whereby landowners and recreationists can air complaints about abuses or unreasonable restrictions in recreational land use.

- Provide a means whereby private landowners can play a more effective role in recreation planning and management in their areas.

Two common forms of recreation in the area are horseback riding and skiing. Lewis & Clark County is widely recognized for its recreatinal opportunities.



MAP 12

LEWIS AND CLARK CONSERVATION DISTRICT
HISTORICAL & RECREATION AREAS
LEWIS AND CLARK COUNTY, MONTANA

JUNE 1979

5 0 5 10 MILES

SCALE 1:500,000

Source
Base map prepared by SCS, WTSC Carto Unit from AMS 1:250,000 series.
Thematic detail compiled by state staff.

U S DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

7-E-24053-12

LEWIS & CLARK COUNTY DEVELOPED RECREATION SITE INVENTORY

	DESCRIPTION		FACILITIES/ACTIVITIES		
	Name	Administrator	*Picnic Units	**Camp Units	Other
○	**FEDERAL OWNERSHIP:**				
1.	McDonald Pass	FS-Helena	10	21	CC,H,HR,I,K
2.	Porcupine	FS-Helena	5	18	F
3.	Moose Creek	FS-Helena	3	--	F
4.	Tenmile Picnic Ground	FS-Helena	8	--	F
5.	Coulter Picnic Ground	FS-Helena	8	3	F
6.	Meriweather Picnic Ground	FS-Helena	8	--	F,HR,K
7.	Indian Flats	FS-Helena	--	5	HR,K
8.	Pike Gulch	FS-Helena	--	5	--
9.	Holter Lake	BLM	14	37	F,B,BA,PG,S,WS
10.	Aspen Grove	FS-Helena	5	19	F
11.	Cooper Creek	FS-Helena	6	20	F
12.	Wood Lake	FS-Lewis & Clark	--	7	F,B
13.	Fly In	FS-Lewis & Clark	--	6	F
14.	South Fork	FS-Lewis & Clark	--	7	F
15.	Home Gulch	FS-Lewis & Clark	--	15	F,B
16.	Vigilante Campground	FS-Helena	3	13	F
△	**STATE OWNERSHIP:**				
1.	Beartooth	Fish/Game	52	22	F,B
2.	Missouri River Recreation Site	Fish/Game	46	--	F,I,FL
3.	Hooper State Recreation Area	Fish/Game	15	9	F,PG
4.	Bean Lake	Fish/Game	5	10	F,B,S
5.	Nilan Reservoir	DNRC	2	--	F
6.	Canyon Ferry Lake				F,B,S,WS
	a. Cave Bay	Fish/Game	6	6	F,S
	b. Cemetery Island	Fish/Game	3	--	F
	c. Confederate Gulch	Fish/Game	3	--	F
	d. Cottonwood	Fish/Game	4	--	F
	e. Court Sheriff	Fish/Game	10	15	F
	f. Crittendon	Fish/Game	7	7	F,S
	g. Dam Area	Fish/Game	7	--	F
	h. Hellgate	Fish/Game	30	31	F,B,S
	i. Indian Road	Fish/Game	10	15	F,B
	j. Jo Bonner	Fish/Game	6	--	F
	k. Lewis & Clark	Fish/Game	6	--	F,S
	l. Lorelei Springs	Fish/Game	5	--	F,S
	m. Mahogany Cove	Fish/Game	3	--	F,S

LEWIS & CLARK COUNTY DEVELOPED RECREATION SITE INVENTORY
(Continued)

DESCRIPTION			FACILITIES/ACTIVITIES		
	Name	Administrator	*Picnic Units	**Camp Units	Other
△	STATE OWNERSHIP: (Continued)				
	Canyon Ferry (cont.)				
n.	Orchards	Fish/Game	4	--	F,S
o.	Overlook	Fish/Game	8	--	--
p.	Riverside	Fish/Game	5	5	F,B
q.	Schaeffer Gulch (or Chinaman's)	Fish/Game	5	10	F,S
r.	Shannon	Fish/Game	15	--	F
⬡	PRIVATE/NON-PROFIT OWNERSHIP:				
1.	Lewis & Clark Fairgrounds	Private	14	--	F,B,S,PGE
2.	Valley Vista K.O.A.	K.O.A.	--	45	T,W,BH
3.	Edgewater (Lakeside)	Private	8	28	F,B,S,W,WS,T
4.	Hauser Lake	Private	--	--	F,B,S,BA
5.	Blacktail Ranch	Private	--	--	F,H,HR
6.	Wagon West	Private	10	54	F,W,PG,BH

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ABBREVIATIONS:

B - Boating
BA - Boat Access
BH - Bath House
CC - Cross Country Skiing
F - Fishing
FL - Floating
H - Hunting
HR - Horseback Riding
I - Point of Interest
K - Hiking
PG - Playground
PGE- Playground with Equipment
S - Swimming
T - Trailer
W - Waste Disposal
WS - Water Skiing

*Picnic Unit - Each unit ordinarily consists of a table with access to a stove or fireplace, garbage can, toilet, and drinking water; will accomodate an average of five persons or one family.

**Camp Unit - Each unit ordinarily consists of a table, parking spur, tent pad and stove or fireplace, with access to a garbage can, toilet, and drinking water; will accommodate an average of five persons or one family.

LEWIS & CLARK COUNTY DEVELOPED HISTORIC SITE INVENTORY

☐ HISTORIC SITES:

1. Marysville Historic District
2. Drumlummon Mill
3. Mullen Road
4. Fort Harrison
5. Helena Historic Sites
    a. Governor's Mansion
    b. Last Chance Gulch
    c. Reeder's Alley
    d. Cathedral of Saint Helena
    e. Old Fire Tower
6. Gates of the Mountains
7. Broadwater Hotel
8. Rimini
9. Scratch Gravel
10. Dearborn City
11. Lincoln
12. Augusta Historic District
13. Marsh Creek
14. Senator Walsh Residence
15. Stemple Gould

Governor's Old Mansion, Helena, Montana

(Picture: Montana Historical
Society, Helena)

HISTORIC SITES

When Captain Meriweather Lewis was ascending the Missouri River on July 19, 1805, he described an area along the river and gave it the name by which it is known today, "Gates of the Mountains". His partner, Captain William Clark, tramped overland accumulating data in his journal. Some of their descriptive names of places in the county have been retained and the association with these famous explorers resulted in the name of Lewis and Clark County.

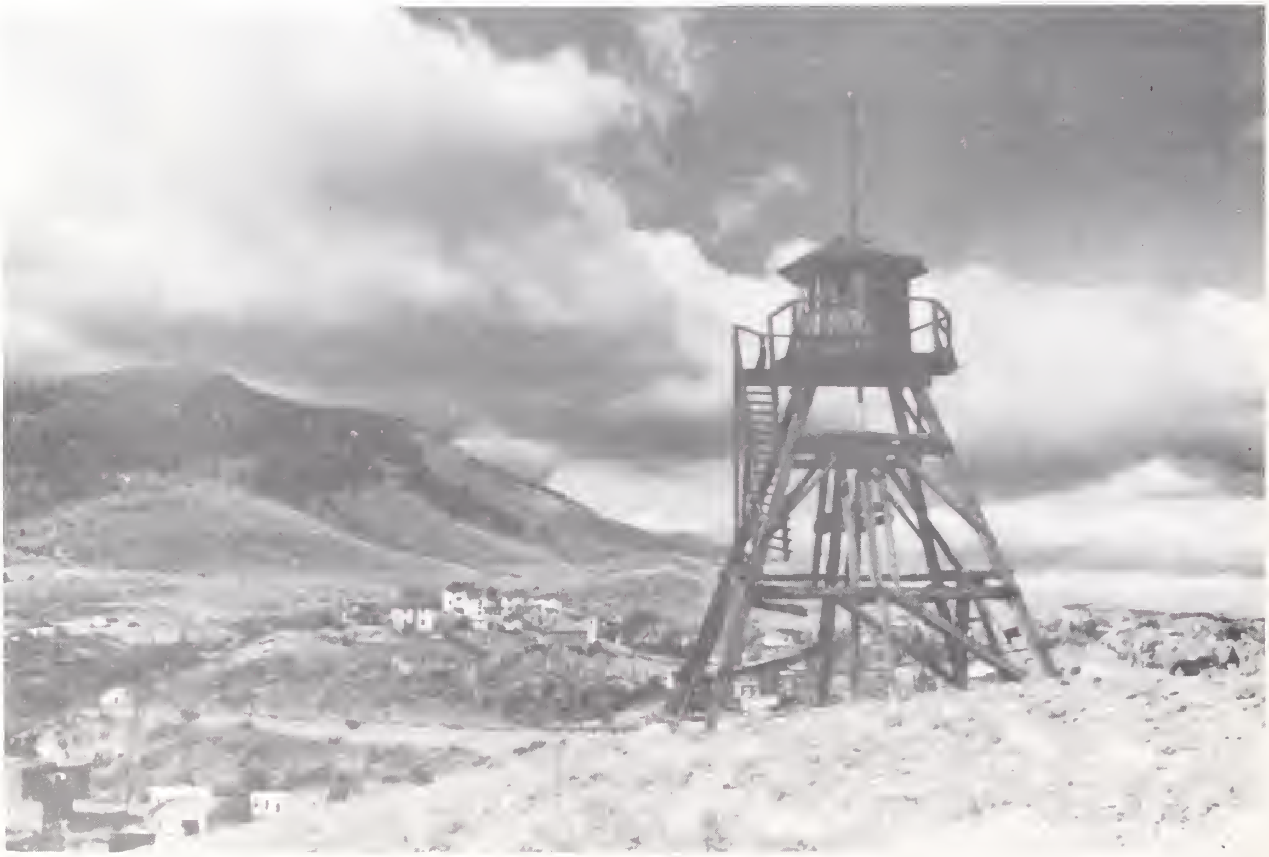
The Lewis and Clark County area was inhabited generally by Blackfoot Indians prior to the coming of the white man. Trappers and fur traders were frequent visitors later.

Fifty-eight years after the Lewis and Clark Expedition, four natives of Georgia who were prospecting for gold made their second visit to the area, agreeing that this was their last chance to strike it rich. A pan of gravel washed near the present home of the Montana Club revealed the first gold from one of the richest deposits ever found. The name "Last Chance Gulch" was given to the strike area and the original streambed is now Helena's downtown main street, also known as Last Chance Gulch. Thirty million dollars was the yield of the gulch during the ensuing years. By 1863 Last Chance was a thriving camp and by 1876 Helena had a population of about 4,000 people.

Dredging for gold in the Helena Valley.

A meeting was held in Last Chance Gulch on October 30, 1864, for the purpose of giving the settlement a name. A train of immigrants from Minnesota arrived in Last Chance Gulch a month before and these Minnesotans predominated the meeting. John C. Somerville of Helena, Scott County, Minnesota, was made Chairman out of deference to age, and Thomas E. Cooper, also of Minnesota, was made Secretary. Many names were proposed, most of them indicating Minnesota origin, such as Winona and Rochester. Mr. Somerville, unused to presiding and confused with parliamentary procedure and the flood of suggestions, emphatically settled the matter with a motion to name the town after the place he'd recently left, "the best town in the county, the best county in the state, and the best state in the Union---Helena, Scott County, Minnesota," and the motion was carried. Following the meeting, Mr. Cooper wrote a letter to his wife saying that some day the city would be the capital of a great state. He prided himself for the more than fifty years of his remaining life that he was the first man to write "Helena, Montana".

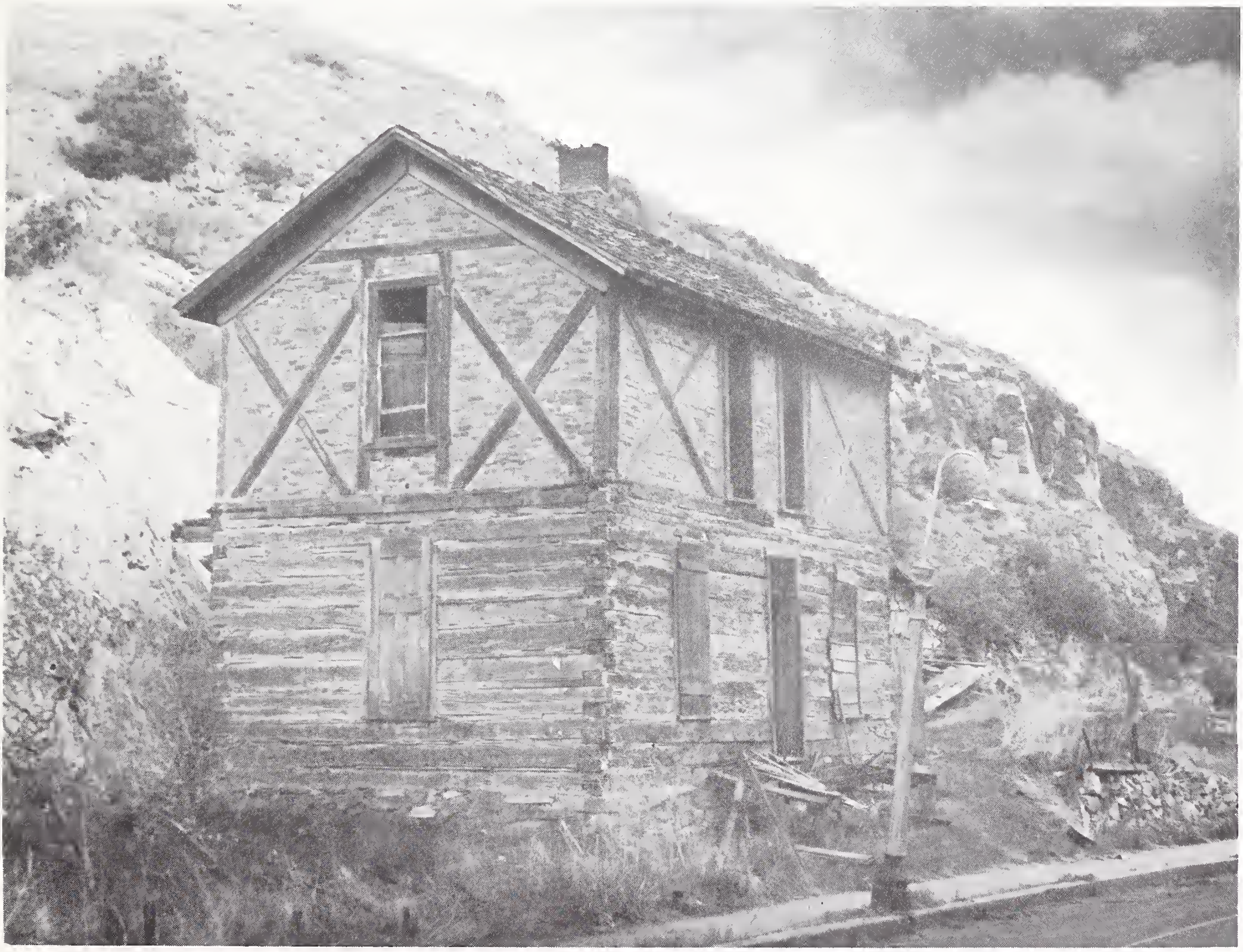
Bannack was the first capital of Montana when the territory was created in 1864. In February of 1865, the capital was moved to Virginia City. Helena had aspirations of becoming the capital almost from the beginning, first of the territory and next of the state. The first contest between Virginia City and Helena for the capital designation was in 1867, but a vote of the people decided in favor of Virginia City. In 1869 a vote again chose Virginia City. Five years later the capital fight was again renewed, and apparently Virginia City won again, but a recount of the vote showed a majority for Helena, and Governor B.F. Potts proclaimed Helena as the capital of the territory.



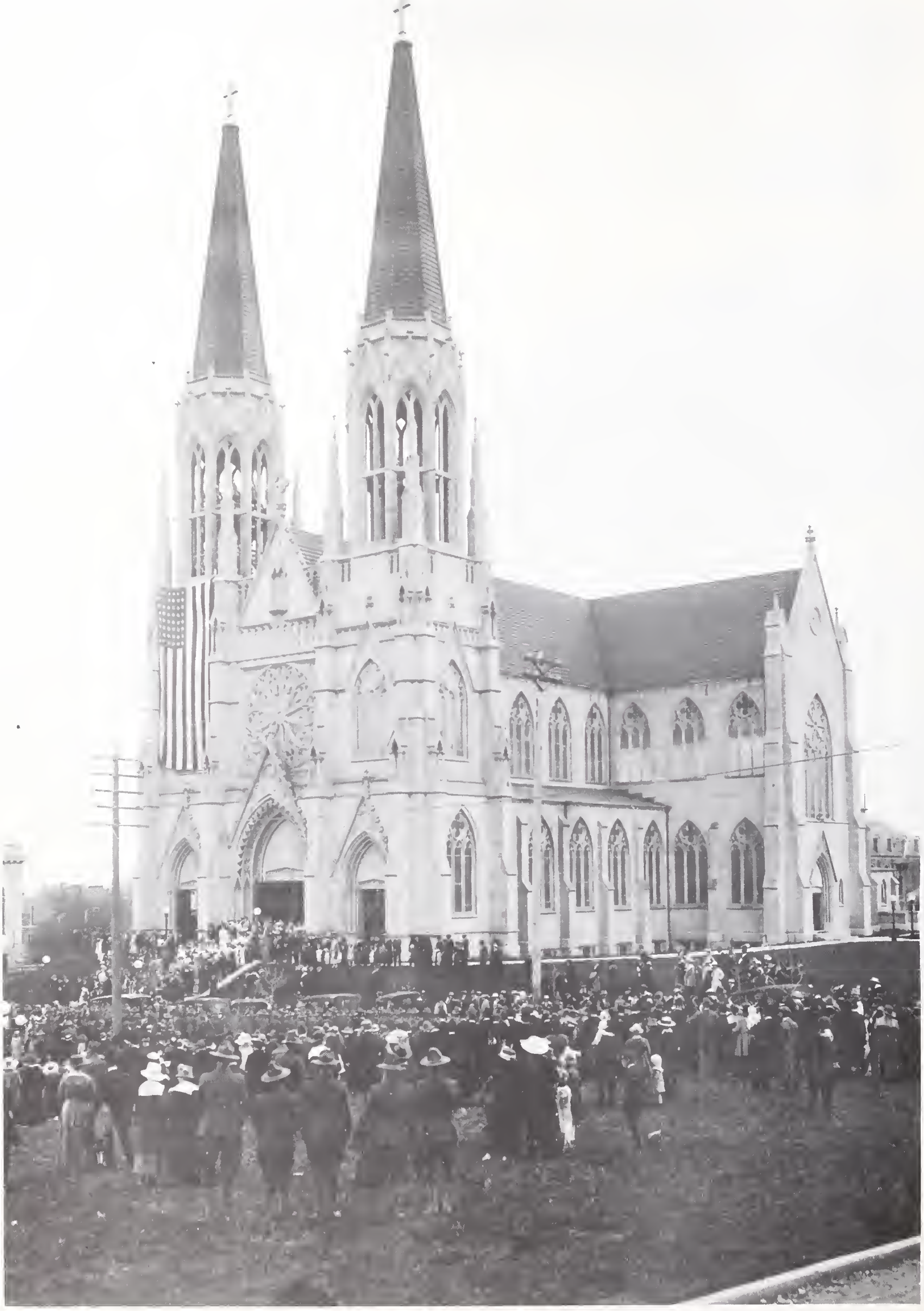
This tower, known as the "Guardian of the Gulch" is located just east of Last Chance Gulch overlooking the city. Beset by four major conflagrations and countless minor blazes in the first 75 years of its history, Helena relied upon watchful men in the tower to sound the alarm in the event of fire.

Following major blazes in 1869, 1872, and the great fire of January 9, 1874, when a million dollar's worth of property was destroyed, most of the buildings in Helena were constructed of brick and stone instead of wood as was previously used.

Helena is rich in history and many areas have been designated as historic sites and preserved for viewing. Some of these sites include the original Governor's Mansion, Reeder's Alley, the Fire Tower, Cathedral of Saint Helena, and others.



This quaint old house on South Park Street was built by Emil Kluge in the late 1860's to resemble his boyhood home in Germany. It has been pronounced by architechts as one of the most unique structures in the northwest.



Cathedral of Saint Helena.

VII WATER QUALITY

WATER QUALITY

The Conservation District recognizes that the effects of water and wind erosion are of increasing importance in our society. Mounting demands for food and water and a healthy environment by the world's rapidly increasing population make it mandatory that conservationists and the public increase their efforts to reduce erosion of the land and to protect soil, water, and air from pollution.

A clear-cut distinction between urban and rural interests no longer exists in the use and management of natural resources. Everyone benefits from better use and management of our natural resources by having more bountiful supplies of food and fiber, clean air, unpolluted streams and reservoirs, and good fishing and swimming. Everyone benefits from wise planning by having safe roads, safe waste disposal, and the selection of building sites free from soil limitations and water hazards. Similarly, all segments of society share the penalties of unwise land use and resource damage.

Loss of valuable topsoil as shown here could be prevented by using grass waterways.

WATER QUALITY PLANNING AND IMPLEMENTATION

The care and management of the land is the prime contributor to clean high quality water. Surface water often indicates the quality of land management being practiced on a particular watershed area. The application of conservation treatments on the land is therefore the primary instrument toward less sediment pollution of the lakes and streams of the District.

The major 'non-point' source of water pollution in this District, or for that matter in the state and nation, is sediment.

Although the water quality within the District is basically good, many stream segments are impaired or will soon be impaired due to erosion and increased sedimentation.

Sediment is not always a pollutant. Sediment produced through the natural erosion process over a period of geologic time results in fertile soils on the flood plains and terraces of our country. Sediment is a pollutant when man disturbs the land surface and fails to adopt satisfactory management systems for the proper care and management of the soil.

Acclerated erosion produces large amounts of sediment in a very short period of time which upsets the delicate balance that nature has taken centuries to develop. Water quality quickly becomes unfit to meet the needs and purposes of life and the quality of our life deteriorates.

Finding solutions to these problems is the prime responsibility of the land user who relies on these resources. The standard of living and the quality of every life is therefore almost totally involved and dependent upon this concept.

The Conservation District is the local unit of government instilled by ethical and legislative authority to fully acquaint landowners of a need to properly use and care for the land entrusted to their use. The Montana Conservation District Law has given Conservation Districts the authority to implement provisions for dealing directly with sediment control by adopting and implementing an ordinance which mandates that the waters of the District will meet or exceed national standards for water quality.

The Conservation District has entered into a signed agreement with the Montana Departments of Natural Resources and Conservation, and Health and Environmental Sciences that very specifically designates the Conservation District as the Non-Point Water Quality Management Agency for Lewis and Clark County. By virtue of this agreement the Conservation District fully accepts the responsibility for identification of non-point pollution problems and for planning in a sound but practical manner effective programs that will result in effective solutions to water quality problems. (See appendix exhibit #1.)

Water quality planning involves all segments of this program.

Effective solutions will involve all aspects of this plan; however, a need is evident to describe water quality problems in relation to watershed areas, and to use this as a basis for setting priorities for solving critical problems within each basin.

To accomplish this goal is a land use analysis: erosion problems relating to a land use, summary of non-point water quality problems and associated management objectives, and summary of available data from studies conducted by others.

Guided by these inventories, Conservation District officials and others have the necessary tools to set up annual programs that reflect priorities, changing social and economic conditions, and the needs of the resources.

The following tables, exhibits and tabulations are presented to acquaint the user with the four major watershed areas in the District. (A portion of a fifth basin was included with the Blackfoot River due to insignificant size in the county.)

Chart #1	Summary of the land use within each watershed area.
Chart #2	Evaluation of the degree of erosion problems by land use and watershed area.
Chart #3	Evaluation of the problem with suggested management objectives and practices to solve that problem.
Chart #4	Information on stream fisheries as prepared by 208 - Fish and Game Department survey of stream conditions.
Chart #5	Silviculture non-point survey assessment on Non-U.S.Forest Service lands for watershed areas.

A careful review of the following information will give a basis for establishing goals and objectives for the Lewis and Clark County Conservation District. This will serve as a guide to supervisors and others in establishing effective programs in the foreseeable future.

Chart #1--SUMMARY OF LAND USE BY DRAINAGE BASIN

Land Use	Missouri River	Dearborn River	Sun River	Blackfoot River	Total
Rangelands and grazeable woodlands-	286,966	266,900	244,729	99,280	897,875
Pasturelands					
Irrigated-----------	4,705	2,425	4,150	1,783	13,063
Non-irrigated-------	2,280	1,135	2,160	425	6,000
Irrigated cropland					
Small grains--------	4,265	420	875	262	5,822
Permanent hay-------	1,899	2,337	3,160	1,664	8,640
Hay in rotation-----	5,015	817	3,359	784	9,975
Dry cropland					
Small grains--------	12,173	10,852	13,150	400	36,575
Hay-----------------	6,075	4,190	8,697	587	19,549
Forestlands					
Federal-------------	292,505	79,946	372,330	318,067	1,062,848
Commercial (state and private)------	11,731	1,400	9,400	26,950	49,581
Developing/built-up areas					
Urban (cities and towns-------------	12,091	340	715	988	14,134
Suburban (subdivisions)----	36,550	3,250	3,521	2,880	46,200
Designated wildlife management areas----	24,321	-0-	8,960	-0-	33,280
Small water bodies----	45	341	975	74	1,361
Other----------------	4,260	2,271	4,060	2,726	13,337
Total---------------	704,880	376,250	680,240	456,870	2,218,240
		Percent			
Rangelands and grazeable woodlands-	41	70	36	22	40
Pasturelands----------	1	1	1	.5	1
Irrigated cropland----	2	1	2	.5	1
Dry cropland----------	3	4	3	1	2.5
Forestlands-----------	43	22	56	75	50
Other uses------------	10	2	2	1	5.5

Chart #2--INVENTORY OF SOIL EROSION BY WATER

Drainage Basin	Erosion Hazard	Land Use: Range and Grazeable Woodland	Land Use: Federal Range and Grazeable Woodland	Land Use: Urban	Land Use: Subdivided	Land Use: Pastureland Irrigated	Land Use: Pastureland Non-Irrigated
Missouri River	Slight---	265,808	256,700	11,392	25,710	3,746	1,911
704,880 acres	Moderate-	20,474	35,125	483	7,300	825	256
32 percent	Severe---	1,013	885	216	3,540	134	113
Sun River	Slight---	252,705	316,482	630	2,571	3,614	2,035
686,240 acres	Moderate-	14,056	44,679	57	701	458	87
30 percent	Severe---	497	11,169	28	245	78	38
Blackfoot River	Slight---	84,287	270,357	873	2,016	1,564	396
456,870 acres	Moderate-	12,794	38,168	79	576	219	21
21 percent	Severe---	2,199	9,542	36	288	47	8
Dearborn River	Slight---	241,716	67,955	300	3,152	2,005	1,067
376,250 acres	Moderate-	21,352	9,593	24	650	360	48
17 percent	Severe---	5,832	2,398	16	330	60	20
Total for Lewis	Slight---	844,516	911,494	13,195	33,449	10,929	5,409
and Clark	Moderate-	68,676	127,565	643	9,227	1,862	412
County	Severe---	9,541	23,994	296	4,403	319	179

Chart #2--INVENTORY OF SOIL EROSION BY WATER--Continued

Drainage Basin	Erosion Hazard	Land Use					
		Forest Land Commercial	Irrigated			Dry	
			Small Grains	Hay in Rotation	Permanent Hay	Hayland	Cropland
Missouri River	Slight---	9,385	3,404	4,502	1,805	7,195	5,046
704,880 acres	Moderate-	1,759	725	401	75	3,651	824
32 percent	Severe---	587	136	112	19	1,327	205
Sun River	Slight---	7,520	718	3,024	3,002	7,870	7,498
686,240 acres	Moderate-	1,410	131	268	126	3,870	975
30 percent	Severe---	470	26	67	32	1,410	224
Blackfoot River	Slight---	21,561	215	704	1,581	268	486
456,870 acres	Moderate-	4,042	39	63	67	95	88
21 percent	Severe---	1,347	8	17	16	37	13
Dearborn River	Slight---	1,200	344	735	1,821	6,784	3,380
376,250 acres	Moderate-	225	63	65	77	144	630
17 percent	Severe---	75	13	17	19	924	180
Total for Lewis	Slight---	39,666	4,681	8,965	8,209	22,117	16,410
and Clark	Moderate-	7,436	958	797	345	7,760	3,517
County	Severe---	2,479	183	213	86	3,698	622

Chart #3--NON POINT SOURCE WATER QUALITY PROBLEMS AND ASSOCIATED BEST MANAGEMENT PRACTICES
Lewis and Clark County, Montana

Land Use and Problem Sources	Problem and Extent	Management Objective	Best Management Practices	SCS Conservation Practice (and Code No.)
Stream bank and channels	1a. Stream bank and channel erosion	1.1 Perform stream bank erosion control	1.1a Slope banks	Streambank Protection (580)
			1.1b Construct riprap	Stream Channel Stabilization (584)
			1.1c Revegetate problem area 1) with grasses 2) with shrubs 3) with trees	Critical Area Planting Fencing (382) Livestock Exclusions
			1.1d Protect problem area from livestock 1) by fencing 2) by developing alternate water supply 3) by changing land use	Fencing (382) Pipeline (516) Pond (378-A) Spring Development (574) Range Seeding (550) Pasture and Hayland Planting (512)
		1.2 Perform channel erosion control	1.2a Provide diversion structure	Diversion (362) Grade Stabilization Structures (410)
			1.2b Remove obstructions from channel	Streambank Protection (580) Debris Removal

Chart #3--NON POINT SOURCE WATER QUALITY PROBLEMS AND ASSOCIATED BEST MANAGEMENT PRACTICES--Continued
Lewis and Clark County, Montana

Land Use and Problem Sources	Problem and Extent	Management Objective	Best Management Practices	SCS Conservation Practice (and Code No.)
Irrigated land	2A. Ditch bank and gully erosion (delivery system)	2.1 Perform reorganization of delivery system(s)	2.1a Line irrigation ditches	Ditch and Canal Lining (430-A-D)
			2.1b Install pipelines	Pipeline (430-AA-GG)
			2.1c Install water control structures	Structural Measures (580-A)
			2.1d Install gradient control checks	Structural Measures (580-A) Grade Stabilization Structures (410)
			2.1e Consolidate ditches	Irrigation Water Conveyance (430)
			2.1f Employ sprinkler system	Sprinkler Irrigation System (440-B) Pipelines (430)
	2B. Ditch bank and gully erosion (return flow system)	2.2 Perform reorganization of return system	2.2a Install control structures	Structural Measures (580-A) Tailwater Recovering (477)
			2.2b Install pipelines	Pipeline (430-A-D)
			2.2c Line irrigation ditches	Ditch and Canal Lining (430-A-D)

Chart #3--NON POINT SOURCE WATER QUALITY PROBLEMS AND ASSOCIATED BEST MANAGEMENT PRACTICES--Continued
Lewis and Clark County, Montana

Land Use and Problem Sources	Problem and Extent	Management Objective	Best Management Practices	SCS Conservation Practice (and Code No.)
Irrigated land (cont.)	2B. Ditch bank and gully erosion (return flow system) (cont.)	2.2 Perform reorganization of delivery system(s) (cont.)	2.2d Gradient control checks	Structural Measures (580-A) Grade Stabilization Structures (410)
			2.2e Consolidate ditches	Irrigation Water Conveyance (430)
	2C. Field sheet and rill erosion	2.3 Reduce sediment loss	2.3a Level land	Irrigated Land Leveling (464)
			2.3b Regulate irrigation run to proper length	Irrigation Water Management (449)
			2.3c Apply proper amount of water	Irrigation Water Management (449)
			2.3d Manage hay production methods	Irrigation Water Management (449) Hayland Management (510-B)
			2.3e Manage livestock pasturing methods	Pasture Management (510-A)
			2.3f Reorganize delivery system	Irrigation Water Conveyance (430)
			1) Employ sprinkler system	Sprinkler Irrigation System (440-B)
			2) Use gated pipe	Irrigation System (440)
			2.3g Change crop use	Pasture and Hayland Manage-Ment (510)

Chart #3--NON POINT SOURCE WATER QUALITY PROBLEMS AND ASSOCIATED BEST MANAGEMENT PRACTICES--Continued
Lewis and Clark County, Montana

Land Use and Problem Sources	Problem and Extent	Management Objective	Best Management Practices	SCS Conservation Practice (and Code No.)
Irrigated land (cont.)	2.C. Field sheet and rill erosion (cont.)	2.3 Reduce sediment loss (cont.)	2.3g Change crop use (cont.)	Conservation Cropping System (328) Pasture and Hayland Planting (510)
			2.3h Employ proper crop rotation program	Conservation Cropping System (328) Pasture and Hayland Management (510) Crop Residue Management
	2D. Salinity due to seepage and artificially high water table	2.4 Reduce total dissolved solids in irrigation return flow and from land surface to a reasonable amount	2.4a Line ditches to control seepage	Ditch and Canal Lining (430-A-D)
			2.4b Apply proper amount of water for crop's needs	Irrigation Water Management (449)
			2.4c Consolidate ditches	Irrigation Water Conveyance (430)
	2E. Wind erosion	2.5 Manage land to prevent or limit soil loss due to high intensity winds	2.5a Maintain crop residue on surface	
			1) perform minimum tillage	Minimum Tillage (478)
			2) perform stubble mulch	Stubble Mulching (344-B)
			2.5b Rotate small grains with winter cover crops	Conservation Cropping System (328)

Chart #3--NON POINT SOURCE WATER QUALITY PROBLEMS AND ASSOCIATED BEST MANAGEMENT PRACTICES--Continued
Lewis and Clark County, Montana

Land Use and Problem Sources	Problem and Extent	Management Objective	Best Management Practices	SCS Conservation Practice (and Code No.)
Irrigated land (cont.)	2E. Wind erosion (cont.)	2.5 Manage land to prevent or limit soil loss due to high intensity winds (cont.)	2.5c Reseed problem areas to a permanent vegetative cover	Vegetative Phase (580-B) Critical Area Treatment
			2.5d Establish field windbreaks	Field Windbreaks (392)
	2F. Water erosion	2.6 Manage land to prevent or limit soil loss due to water erosion	2.6a Level land	Irrigation System (440) Land Leveling (464) Irrigation Water Management (449)
			2.6b Install contour ditch systems	Irrigation Water Management (449) Irrigation System (440)
			2.6c Install sprinkler system	Irrigation System (440-B) Irrigation Water Conveyance (430) Irrigation Water Management (449)
Rangeland	3A. Sheet and rill erosion	3.1 Manage range to achieve climax cover and to limit sediment loss	3.1a Reduce grazing	Planned Grazing System (556) Deferred Grazing (352)
			3.1b Rest range and rotate grazing	Deferred Grazing (352) Planned Grazing System (556)
			3.1c Achieve uniform grazing intensity 1) Construct fence	Fencing (382)

Chart #3--NON POINT SOURCE WATER QUALITY PROBLEMS AND ASSOCIATED BEST MANAGEMENT PRACTICES--Continued
Lewis and Clark County, Montana

Land Use and Problem Sources	Problem and Extent	Management Objective	Best Management Practices	SCS Conservation Practice (and Code No.)
Rangeland (cont.)	3A. Sheet and rill erosion (cont.)	3.1 Manage range to achieve climax cover and to limit sediment loss (cont.)	3.1c Achieve uniform grazing intensity (cont.) 2) Properly locate livestock water supply	Pipeline (516) Well (642) Pond (378) Tank (614) Spring Development (574)
			3.1d Retain sediment 1) Employ pits 2) Construct contour ditches	Debris Basin (350) Dike (356) Diversion (362)
			3.1e Retard runoff	Dike (356) Diversion (362)
	3B. Gully erosion	3.2 Provide a grassed waterway that will carry runoff water without causing erosion	3.2a Reduce water runoff 1) See 3.1a, 3.1b 3.1c, 3.1d, and 3.1e under Sheet and Rill Erosion	Pond (378-A) Dike (356) Diversion (362)
			3.2b Shape waterway and establish vegetative cover	Brush Management (314) Grassed Waterway or Outlet (412) Vegetative Phase (480-B)

Chart #3--NON POINT SOURCE WATER QUALITY PROBLEMS AND ASSOCIATED BEST MANAGEMENT PRACTICES--Continued
Lewis and Clark County, Montana

Land Use and Problem Sources	Problem and Extent	Management Objective	Best Management Practices	SCS Conservation Practice (and Code No.)
Rangeland (cont.)	3B. Gully erosion (cont.)	3.3 Provide a structure(s) to divert runoff through a controlled or safe outlet	3.3a Construct sediment retention structures with discharge through proper drop pipe and on safe gradient	Diversion Dam (348) Floodwater Retarding Structures (402)
			3.3b Provide diversion structure	Diversion (362)
			3.3c Construct a series of drops to alter gradient	Water Control Structures Grade Stabilization Structures (410)
	3C. Wind erosion	3.4 Manage range to achieve sufficient cover of climax species so that high intensity winds will not move soil particles	3.4a Reduce grazing intensity	Proper Grazing Use Planned Grazing System (556)
			3.4b Rest range and rotate grazing	Deferred Grazing (352) Planned Grazing System (556)
			3.4c Achieve uniform intensity 1) Construct fence 2) Properly locate livestock water supply	Deferred Grazing (352) Fencing (382) Pipeline (516) Well (642) Pond (378) Tank (614) Spring Development (574)

Chart #3--NON POINT SOURCE WATER QUALITY PROBLEMS AND ASSOCIATED BEST MANAGEMENT PRACTICES--Continued
Lewis and Clark County, Montana

Land Use and Problem Sources	Problem and Extent	Management Objective	Best Management Practices	SCS Conservation Practice (and Code No.)
Rangeland (cont.)	3C. Wind erosion (cont.)	3.4 Manage range to achieve sufficient cover of climax species so that high intensity winds will not move soil particles (cont.)	3.4d Establish vegetative cover	Range Seeding (550) Critical Area Seeding (342)
			3.4e Establish grass, shrub, or tree windbreaks	Field Windbreaks (392) Range Seeding (550)
Concentrated winter feeding	4A. Organic material, nutrients and coliforms entering receiving waters	4.1 Manage animal waste disposal to limit water pollution	4.1a Relocate feeding grounds	Heavy Use Area Protection (561)
			4.1b Fence livestock from streambank area	Fencing (382)
			4.1c Harrow or disc into soil on site	Waste Utilization (633)
			4.1d Develop livestock watering sources away from stream	Ponds (378) Pipeline (516) Well (642) Tank (614)
			4.1e Construct artificial windbreak away from stream	Field Windbreaks (392)
	4B. Sediment and erosion along stream bank	4.2 Restrict livestock from stream bank	4.2a Fence livestock from stream bank	Fencing (382)

Chart #3--NON POINT SOURCE WATER QUALITY PROBLEMS AND ASSOCIATED BEST MANAGEMENT PRACTICES--Continued
Lewis and Clark County, Montana

Land Use and Problem Sources	Problem and Extent	Management Objective	Best Management Practices	SCS Conservation Practice (and Code No.)
Concentrated winter feeding (cont.)	4B. Sediment and erosion along stream bank (cont.)	4.2 Restrict livestock from stream bank (cont.)	4.2b Relocate feeding areas	
			1) Construct artificial windbreak	Farmstead and Feedlot Windbreaks (380) Field Windbreaks (392)
			2) Establish tree windbreak away from stream	
			3) Develop alternate livestock watering source	Pipeline (516) Well (642) Pond (378) Tank (614) Spring Development (574)
Dry cropland	5A. Sheet and rill erosion	5.1 Manage cropland to limit sediment loss	5.1a Reseed areas to a permanent vegetative cover	Pasture and Hayland Planting (512) Critical Area Planting (342)
			5.1b Crop land intensively	Conservation Cropping System Crop Residue Management (328) Flexible Cropping System
			5.1c Rotate legumes with small grains and summer fallow	Conservation Cropping System (328) Grass and Legumes in Rotation

Chart #3--NON POINT SOURCE WATER QUALITY PROBLEMS AND ASSOCIATED BEST MANAGEMENT PRACTICES--Continued
Lewis and Clark County, Montana

Land Use and Problem Sources	Problem and Extent	Management Objective	Best Management Practices	SCS Conservation Practice (and Code No.)
Dry cropland (cont.)	5A. Sheet and rill erosion (cont.)	5.1 Manage cropland to limit sediment loss (cont.)	5.1d Maintain crop residue on surface 1) Perform minimum tillage 2) Perform stubble mulch	Crop Residue Management Minimum Tillage (478) Stubble Mulching (344-B)
			5.1e Practice field strip-cropping	Stripcropping, Contour (585-A)
			5.1f Practice contour cropping	Stripcropping, Contour (585-A) Field Stripcropping
	5B. Gully erosion	5.2 Provide a grassed waterway that will carry runoff water without causing erosion	5.2a See Sheet and Rill Erosion Conservation Practices (5A)	
			5.2b Establish grassed waterways 1) Reseed problem areas	Grassed Waterway or Outlet (412) Waterway Seeding Critical Area Seeding (342)

Chart #3--NON POINT SOURCE WATER QUALITY PROBLEMS AND ASSOCIATED BEST MANAGEMENT PRACTICES--Continued
Lewis and Clark County, Montana

Land Use and Problem Sources	Problem and Extent	Management Objective	Best Management Practices	SCS Conservation Practice (and Code No.)
Dry cropland (cont.)	5C. Wind erosion	5.3 Manage cropland to limit movement of soil particles by high intensity winds	5.3a See Sheet and Rill Erosion Conservation Practices (5A)	
			5.3b Establish field windbreaks	Field Windbreaks (392)
Developing areas Subdivisions	6A. Disturbance of land surface during construction	6.1 Reduce sediment loss by establishing protective soil cover	6.1a Salvage and stock pile usable topsoil for later use in establishing vegetation on disturbed areas	Topsoiling
			6.1b Stabilize disturbed soil surface	
			1) by mulching	Critical Area Stabilization (with mulching only)
			2) by temporary seedings	Critical Area Stabilization (with temporary seedings)
			3) by establishing permanent cover	Critical Area Stabilization (with semi-permanent and permanent seedings)
			4) by sodding	Critical Area Stabilization (with sod)
			5) by planting trees, shrubs & ground cover	Critical Area Stabilization (with trees, shrubs, vines and ground cover)

Chart #3--NON POINT SOURCE WATER QUALITY PROBLEMS AND ASSOCIATED BEST MANAGEMENT PRACTICES--Continued
Lewis and Clark County, Montana

Land Use and Problem Sources	Problem and Extent	Management Objective	Best Management Practices	SCS Conservation Practice (and Code No.)
Developing areas Subdivisions (cont.)	6A. Disturbance of land surface during construction activities (cont.)	6.2 Reduce or divert surface water runoff to minimize erosion and sediment transport	6.2a Control storm water runoff to minimize erosion and sediment movement	
			1) by diverting	Straw Bale Dike Diversion Dike
			2) by intercepting	Interceptor Dike
			3) by transporting and disposing	Grassed Waterway or Outlet
			4) by conveying over disturbed area	Grade Stabilization Structure Chute or Flume
		6.3 Trap and retain sediment on the site of land disturbing activity until area becomes stabilized	6.3a Construct barrier or basin in drainageway to trap and store sediment	Sediment Basin Debris Basin
Forestlands				
Logging roads	7A. Gully erosion and mass failure of cuts and fills	7.1 Reduce sediment loss from logging roads by proper maintenance, design, and location	7.1a Reshape or regrade road surface to minimize erosion and runoff velocities	Access Roads (560)

Chart #3--NON POINT SOURCE WATER QUALITY PROBLEMS AND ASSOCIATED BEST MANAGEMENT PRACTICES--Continued
Lewis and Clark County, Montana

Land Use and Problem Sources	Problem and Extent	Management Objective	Best Management Practices	SCS Conservation Practice (and Code No.)
Forestlands Logging roads (cont.)	7A. Gully erosion and mass failure of cuts and fills (cont.)	7.1 Reduce sediment loss from logging roads by proper maintenance, design, and location (cont.)	7.1b Revegetate critical areas	Critical Area Planting (342)
			7.1c Install or improve placement of water bars and culverts	Water Control Structure
			7.1d Plant vegetative buffer strips between road fill and streams	Critical Area Planting (342) Brush Management
			7.1e Abandon and revegetate unnecessary, problem-producing roads	Critical Area Planting (342)
			7.1f Close roads to use during spring runoff	---
			7.1g Install properly designed bridge where culverts are not adequate or practical	Water Control Structure

Chart #3--NON POINT SOURCE WATER QUALITY PROBLEMS AND ASSOCIATED BEST MANAGEMENT PRACTICES--Continued
Lewis and Clark County, Montana

Land Use and Problem Sources	Problem and Extent	Management Objective	Best Management Practices	SCS Conservation Practice (and Code No.)
Forestlands Logging roads (cont.)	7A. Gully erosion and mass failure of cuts and fills (cont.)	7.1 Reduce sediment loss from logging roads by proper maintenance, design, and location (cont.)	7.1h Locate and design roads to avoid long sustained steep slopes and high erosion hazard areas	Access Roads
Timber harvesting	7B. Accelerated soil erosion caused by unplanned or careless timber harvesting practices	7.2 Reduce erosion and sedimentation by carefully planning the proposed activities	7.2a Determine other timber harvesting activities in watershed and plan accordingly	----
			7.2b Leave vegetative buffer strips to trap sediment and minimize water temperature increases	Brush Management Critical Area Treatment (342)
			7.2c Avoid logging across streams	
			7.2d Use logging method best suited to soil types and season	

Chart #3--NON POINT SOURCE WATER QUALITY PROBLEMS AND ASSOCIATED BEST MANAGEMENT PRACTICES--Continued
Lewis and Clark County, Montana

Land Use and Problem Sources	Problem and Extent	Management Objective	Best Management Practices	SCS Conservation Practice (and Code No.)
Timber harvesting	7B. Accelerated soil erosion caused by unplanned or careless timber harvesting practices (cont.)	7.2 Reduce erosion and sedimentation by carefully planning the proposed activities (cont.)	7.2e Design and locate skid trails and skidding operations for minimum disturbance	
			7.2f Keep logs and debris from entering stream	
			7.2g Install water bars on skid trail when job is complete	Water Control Structures
			7.2h Reseed disturbed areas to accelerate revegetation. Mulch with hay or straw if necessary.	Critical Area Treatment
			7.2i Keep chemicals and oil from entering stream	Debris Basins (350)
Grazing (Woodland)	7C. Accelerated erosion due to overgrazing	7.3 Manage land to maintain sufficient cover and to limit sediment loss	See Best Management Practices for Rangeland	

Chart #3--NON POINT SOURCE WATER QUALITY PROBLEMS AND ASSOCIATED BEST MANAGEMENT PRACTICES--Continued
Lewis and Clark County, Montana

Land Use and Problem Sources	Problem and Extent	Management Objective	Best Management Practices	SCS Conservation Practice (and Code No.)
Recreational use	7D. Gully erosion and sedimentation	7.4 Limit off-road vehicles to designated roads and trails	7.4a Close access to undesignated trails	
			7.4b Abandon and reseed problem-producing trails	Critical Area Planting

Grass waterway needed.

Grass waterway installed.

Chart #4--STREAM-FISHERIES INVENTORY
208-Fish & Game Department
Survey of Stream Conditions

STREAM	UPPER BOUNDARY	LOWER BOUNDARY	LENGTH	BASIN
MAN-CAUSED POLLUTION:				
Mining Related				
Willow Creek	Sandbar Creek	Mouth	5.0	Blackfoot
Prickly Pear Creek	Clancy Creek	Mouth	33.8	Missouri
Silver Creek	Below Marysville	Near Silver City	3.4	Missouri
Virginia Creek	Rooster Bill Creek	Mouth		Missouri
Irrigation Related				
Middle Fork Dearborn	Headwaters	Mouth	16.9	Dearborn
Seven Mile Creek	Mouth Park Creek	Mouth	8.7	Missouri
WATER REMOVED OR FLUCTUATED FOR:				
Agriculture				
Poorman Creek	Fields Gulch	Mouth	9.3	Blackfoot
Beaver Creek	Forks	Mouth	22.5	Missouri
Little Prickly Pear	Headwaters	Mouth	56.8	Missouri
Seven Mile Creek	Mouth Park Creek	Mouth	8.7	Missouri
Silver Creek	Below Marysville	Near Silver City	3.4	Missouri
South Fork Dearborn	Near Forks	Mouth	16.4	Dearborn
Ten Mile Creek	Forest Boundary	FAS 356	13.7	Missouri
Elk Creek	Forest Boundary	Mouth	36.8	Sun
Ford Creek	Forest Boundary	Nilan Reservoir Div.	10.0	Sun

Chart #4--STREAM-FISHERIES INVENTORY-(cont.)
208-Fish & Game Department
Survey of Stream Conditions

STREAM	UPPER BOUNDARY	LOWER BOUNDARY	LENGTH	BASIN
Smith Creek	Forest Boundary	Mouth	22.5	Sun
Willow Creek	Forest Boundary	Willow Creek Reservoir	21.2	Sun
CHANNEL ALTERED FOR:				
Agriculture				
Little Prickly Pear	Near Headwaters	Mouth	56.8	Missouri
Trout Creek	Forks	Mouth	11.3	Missouri
WATERSHED ABUSE DUE TO:				
Logging Practices				
South Fork Stickney Creek	County Line	Mouth	13.5	Missouri
Overuse by Stock				
Falls Creek	Forks	Mouth	5.8	Dearborn
Elkhorn Creek	Headwaters	Mouth	11.3	Sun
Lyons Creek	Headwaters	Mouth	7.2	Missouri
Willow Creek	Forest Boundary	Mouth	4.0	Missouri
Wolf Creek	Near Forks	Mouth	14.8	Missouri
Sheep Creek	Forks	Mouth	8.7	Missouri
Sun River	Forest Boundary	Elk Creek	47.9	Sun

Chart #4--STREAM-FISHERIES INVENTORY-(cont.)
208-Fish & Game Department
Survey of Stream Conditions

STREAM	UPPER BOUNDARY	LOWER BOUNDARY	LENGTH	BASIN
BANK ENCROACHMENT BY:				
Agriculture				
Little Prickly Pear	Near Headwaters	Mouth	56.8	Missouri
Trout Creek	Forks	Mouth	11.3	Missouri
DETERIORATING STREAM HABITAT:				
Little Prickly Pear	Near Headwaters	Mouth	56.8	Missouri
Lyons Creek	Near Headwaters	Mouth	7.2	Missouri
Magpie Creek	F.S. Boundary	Mouth	2.4	Missouri
Middle Fork Dearborn	Near Headwaters	Mouth	16.9	Dearborn
Seven Mile Creek	Mouth Park Creek	Mouth	8.7	Missouri
South Fork Stickney Creek	County Line	Mouth	13.5	Missouri
Ten Mile Creek	Forest Boundary	FAS 356	13.7	Missouri
Trout Creek	Forks	Mouth	11.3	Missouri
Elk Creek	Forest Boundary	Mouth	36.8	Sun

Chart #5--SILVICULTURE NPS ASSESSMENT - NON-USFS LANDS

Lewis and Clark County, Montana

Drainage Basin	Location	Stream Affected	Problem	Cause	Suggested Measures of Mitigation/Prevention
Blackfoot	T14-15N, R7W	Beaver Creek (perennial)	High sediment load	Extensive road and harvests; steep gradient of stream	Reclaim or rehabilitate roads, assist revegetation; maintain streambank stability
	T14-15, R8W	Landers Fork and North Fork (perennial)	High sediment load; unstable streambanks; soil movement	Logging practices, grazing practices, and a natural fire	Assist streambank rehabilitation; evaluate watershed impacts and coordinate future management activities within watershed limitations
	T14N, R7W Sec. 15-17, 21	Hogum Creek (perennial)	Possible accelerated erosion	Harvested on steep slopes	Identify whether or not problem exists, then proceed (if necessary) with mitigation measures (enhance revegetation, etc.)
	T11N, R6W	Hope Creek (perennial)	Sedimentation; possible water yield increases	Road construction; clearcut harvesting	Rehabilitate roads (seeding erosion and drainage structures); enhance revegetation
	T11N, R6W	Dog Creek (perennial)	Sedimentation; possible water yield increases	Road construction; clearcut harvesting	Rehabilitate roads (seeding erosion and drainage structures); enhance revegetation

Chart #5--SILVICULTURE NPS ASSESSMENT - NON-USFS LANDS
Lewis and Clark County, Montana

Drainage Basin	Location	Stream Affected	Problem	Cause	Suggested Measures of Mitigation/Prevention
Dearborn	T16N, R6W	Green Creek (perennial)	Accelerated erosion	Road construction (steep slopes, erosive soil conditions)	Reclaim roads if not used (regrade, seed); rehabilitate and maintain roads if in use (reduce slope, install erosion control structures, seed shoulders and fills)
	T16N, R6W	Middle Fork Dearborn River (perennial)	Accelerated erosion	Road construction (steep slopes, erosive soil conditions)	Reclaim roads if not used (regrade, seed); rehabilitate and maintain roads if in use (reduce slope, install erosion control structures, seed shoulders and fills)
	T18N, R7W	Dearborn River (perennial)	Potential problem (accelerated erosion)	Non-coordination of harvest and road building activities among mixed ownership	Plan silvicultural activities with regard to physical limitations of site and watershed; coordinate planning with adjacent landowners

Chart #5--SILVICULTURE NPS ASSESSMENT - NON-USFS LANDS

Lewis and Clark County, Montana

Drainage Basin	Location	Stream Affected	Problem	Cause	Suggested Measures of Mitigation/Prevention
Missouri	T11N, R5W	East Skelly Gulch (perennial)	Sedimentation; channel impacts	Streamside harvest; logging across stream	Rehabilitate channel and stabilize streambanks (fill in skid trails, seeding)
	T15N, R5W	Wolf Creek (perennial)	Sedimentation; channel impacts	Logging debris in stream (possibly complicated by streamside grazing activity)	Remove debris from stream channel and rehabilitate streambanks as necessary
	T13N, R5-6W	Rattlesnake Creek and Mill Creek (perennial)	Possible accelerated erosion	Generally poor harvest practices	Identify specific problems and mitigate accordingly
	T15N, R2W	South Fork Stickney Creek (perennial)	Not defined by Department of Fish and Game	Watershed abuse due to logging practices	Investigate problem and implement necessary measures

GOAL AND OBJECTIVES FOR IMPROVING WATER QUALITY

The goal is to protect and maintain the quality of surface waters of the Conservation District by:

1. The establishment of approved cultural, vegetative, and structural practices as needed on all lands of the District to prevent erosion.

2. The establishment of erosion control practices as needed on all residential, industrial, road construction, and other nonagricultural uses of lands.

3. The establishment of irrigation water management techniques on all irrigated lands in the interest of conserving and effectively using the soil, water, and energy resources of the District.

4. The preservation and protection of existing high quality surface water areas and the improvement of surface waters currently being degraded to acceptable standards.

Alternative ways of accomplishing these objectives are as follows:

Information and Education

Programs will be implemented and emphasized to fully acquaint all county residents with water quality objectives: (1) individual communications on the various alternatives, (2) community meetings to encourage groups participation, (3) "show me" tours, (4) improved use of the news media and (5) establishment of demonstration areas will all receive attention and priority in the establishment of an annual plan of operations. Technical assistance on this subject will be encouraged from the Cooperative Extension Service, Soil Conservation Service, and others under the direction of the Conservation District toward a unified approach to overall information and education.

Technical Assistance

This will be provided to individuals, groups, and units of government for the planning and application of approved treatments.

Technical Handbooks

This will be prepared to assist land developers, engineers and architects to prepare erosion and sediment control plans for developing areas.

Financial Assistance

Programs will be selected from various agencies and organizations for the application of several programs to improve water quality. The Conservation District recognizes the need for this assistance in that the public benefits often outweigh the economic benefit to the landuser. Such programs as the traditional Agricultural Conservation Program administered by the A.S.C.S. will be encouraged to continue along with additional programs such as the Rural Clean Water Act, the Great Plains Conservation Program, and others.

Regulatory Assistance

This will be administered by the Conservation District to provide a close working liaison with the landuser.

(1) Natural Streambed and Land Preservation Act (SB-310). This is a state law administered by the Conservation District that mandates that anyone performing work on any natural perennial stream in the District to secure a permit from the Conservation District prior to the performance of that activity. (See Appendix Exhibit #4.)

(2) Soil erosion and sediment control ordinance has been developed and approved by a District-wide referendum which mandates the preparation and approval of erosion control plans for forestry and urban areas. Agricultural activities are excluded from the approved plan situation; however, the land must be managed to meet or exceed the standards adopted by this ordinance. Currently, approved conservation plans for farms and ranches shall be deemed as in compliance with all provisions of the ordinance.

In summary, this ordinance directs that "no occupier or person may cause or conduct, contract for, or authorize any activity which results in man caused erosion or sediment damage within the District". (See Appendix Exhibit #2.)

(3) Technical assistance for the administration and implementation of regulatory type programs will be solicited from all sources including:

(a) Funding from the Montana Department of Health and Environmental Sciences,
(b) Funding from the Department of Natural Resources and Conservation, and
(c) Others to provide Conservation District employees to assist individuals, groups, and units of government in the planning and application of approved treatments.

WATER QUALITY PRIORITIES

The effective formulation of a plan of action to improve water quality includes recognition of problems, evaluation of alternative solutions, and setting of priorities to get the job done.

The setting of priorities must consider the direction of efforts toward solutions to the most serious problem areas. This priority problem area in Lewis & Clark County has been identified by the Conservation District as streambank erosion. Solving this particular problem would involve the concept of stream corridor management, including the improvement and maintenance of riparian vegetation.

The primary priority selection of stream corridor management implies that the District will utilize available or potential funds to inventory the primary streams in each of the four major drainage basins. The results of these inventories will provide the basis for management systems and assist in the proper administration of the Natural Streambed and Land Preservation Act and the local Sediment Control Ordinance. The use of this data will allow better decisions concerning potential solutions to the problems of the stream system.

Riparian vegetation provides the necessary protection for many erosive sites, the buffering of runoff to less erosive velocities, and provides an effective filter to trap sediment entering streams.

The establishment and maintenance of vegetation demands that it be protected from overgrazing, trampling, and other misuses that are quite common in many streams. In many cases this will necessarily mean fencing, developing livestock water sources, and esclusion of detrimental influences from these areas.

In defining this priority it is not the intent of the Conservation District to underestimate the importance of other conservation management and development programs outside the stream corridor. However, emphasis is being placed on the importance of these concepts and how the total understanding of land management within a watershed lends itself to the solution of water quality problems in that area.

The Conservation District Supervisors will select the appropriate area based on severity of the problems and the opportunity to work with landowners to effectuate solutions to problems within that area.

Following is a list of streams within each drainage basin which are considered highest priority for inventory purposes:

Missouri River Basin: Prickly Pear Creek below East Helena
Ten Mile Creek
Little Prickly Pear Creek

Dearborn River Basin:	Dearborn River Flat Creek, including parts of Middle and South Fork Falb Creek
Sun River Basin:	Elk Creek Black River Basin Landers Fork Blackfoot River to County Line

The data collected by this assessment will be used to recommend implementation by voluntary or regulatory methods those programs that provide long-term solutions to the recognized sediment producing problems.

Photograph: Soil Conservation Service

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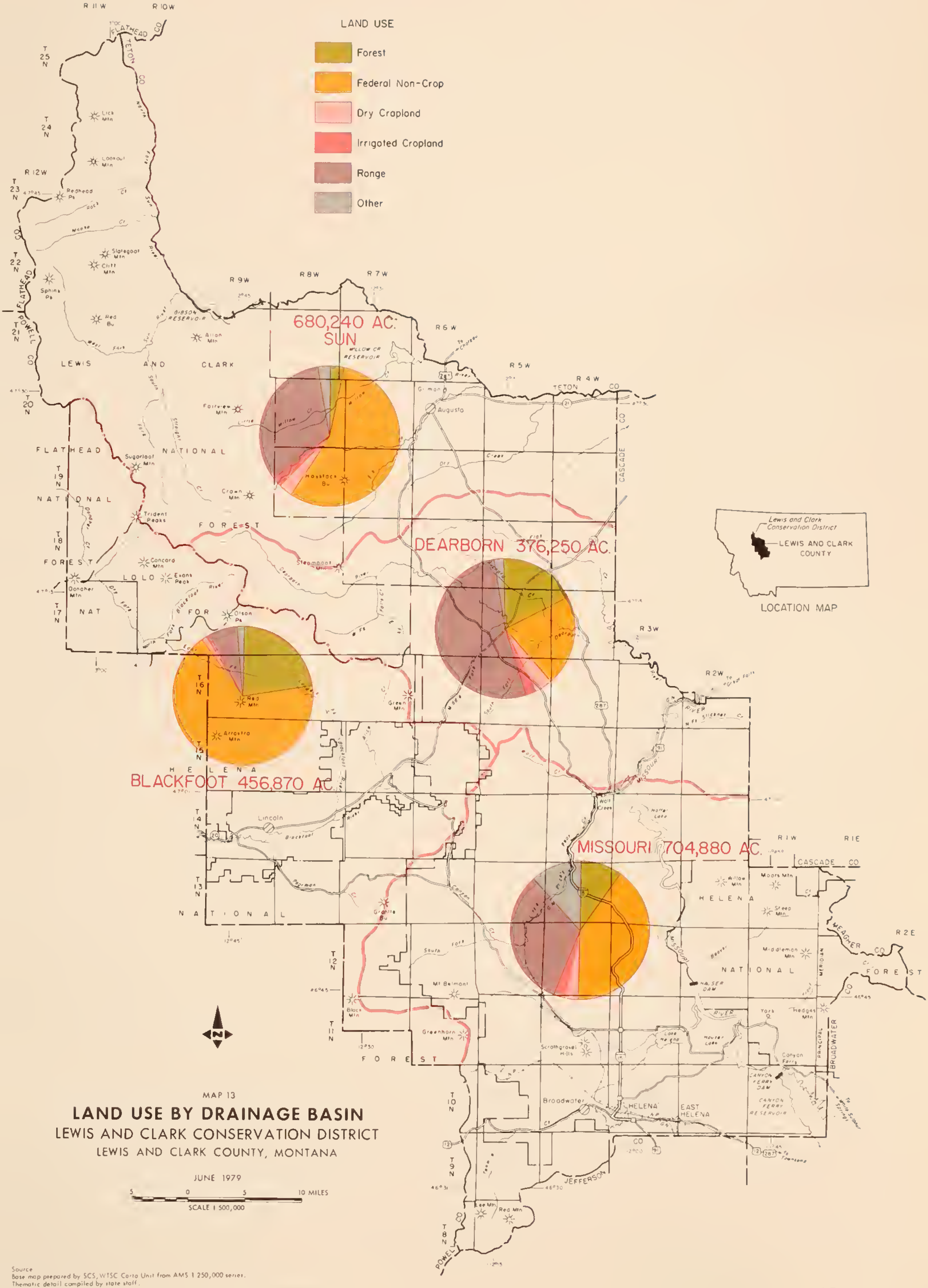

MAP 13

LAND USE BY DRAINAGE BASIN

LEWIS AND CLARK CONSERVATION DISTRICT
LEWIS AND CLARK COUNTY, MONTANA

JUNE 1979

5 0 5 10 MILES
SCALE 1:500,000

Source
Base map prepared by SCS, WTSC Carto Unit from AMS 1:250,000 series.
Thematic detail compiled by state staff.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

M7-EN-24053-13

VIII SOCIAL RESOURCE INVENTORY

ENVIRONMENTAL CONSERVATION EDUCATION

Environmental awareness and appreciation for our natural resources are often formed during youth. As such, the District will place greater emphasis on assisting the educational system to expand programs of natural resource management and conservation among our school children. Special efforts will be made by the District to locate and preserve a suitable area in the county which could be used as a natural area for study by biological and ecological classes.

The Conservation District, which has active working agreements with numerous governmental agencies, has the opportunity to draw upon a vast reserve of resource specialists who can assist in the presentation of educational programs. Also, many educational aids are available to the District for distribution to schools through various organizations such as the Soil Conservation Society of America. It is therefore the intent of the District Supervisors to not only initiate conservation education school programs, but to act somewhat as a coordinator to provide resource people and educational materials. The District will rely heavily on the Cooperative Extension Service for assistance in this endeavor.

Specific activities and programs will be set forth in the District's annual work plan. Long range objectives for conservation education are as follows:

Objectives

1. Distribute conservation education aids produced by the Soil Conservation Society of America to all grade schools within the county.

2. Supply conservation reference materials to school libraries in order that natural resource reference collections may be maintained and supplemented.

3. Seek to assist educators in the presentation of natural resource conservation-related topics to biology and field ecology students.

4. Establish an "outdoor classroom" approach with the various schools to discuss natural resource topics and explain conservation management concepts. Examples of subjects which may be considered are plant identification and succession, soil conservation, range management principles, wildlife, water ecology, etc.

Listed are the schools in the county, grades served, and the student enrollment during the 1978-79 school year.

School	Grades Served	Enrollment
Helena District No. 1		
Broadwater School	K-6	339
Bryant School	K-6	285
C. R. Anderson School	K-6	313
Central School	K-6	318
Four Georgians School	K-6	515
Hawthorne School	K-6	195
Jefferson School	K-6	293
Lincoln School	K-6	171
Ray Bjork School	K-6	207
Rossiter School	K-6	410
Smith School	K-6	288
C. R. Anderson School	7-9	740
Capital High School	9-12	1,237
Helena High School	9-12	1,357
Helena Jr. High School	7-9	761
Helena District No. 2		
Kessler School	K-6	249
Helena District No. 3		
Jim Darcy School	1-6	317
Warren School	1-6	177
Trinity District No. 4		
Trinity School	1-6	15
East Helena District No. 9		
Clinton Street School	4-8	435
Main Street School	K-3	243
Wolf Creek District No. 13		
Wolf Creek School	1-6	23

School	Grades Served	Enrollment
Craig District No. 25		
Craig School	1-6	10
Auchard Creek District No. 27		
Auchard Creek School	1-8	10
Lincoln District No. 38		
Lincoln School	1-8	89
Augusta District No. 45		
Augusta School	K-8	121
Augusta High School	9-12	95

Conserving our natural resources should be taught to the young to give them an understanding of how to protect their environment and resources for the future.

POPULATION

The population of a given area is an indicator of expected use and abuse of the natural resource. People need land to develop for homesites; to use as open space; a place in the country; homes away from home and a variety of other reasons. To accommodate these needs the Conservation District and others need to be aware of expected trends in population so proper planning and development can occur in timely and orderly ways.

Populations of people also demand considerations for recreation in its full spectrum - scenery, wildlife, solitude, history, streams, lakes, roads, trails, campgrounds and open space - all demanding the consideration of the resources available along with good planning and development to insure prolonged use.

The Conservation District needs to be aware of population trends and needs to properly direct appropriate communications and arouse public awareness in the people they serve. This area of consideration can have a significant impact on the types of programs, policies and opportunities that make up the operation of the District.

Increased populations of people make it necessary to plan and zone lands for agricultural uses to insure that the agricultural base is maintained while at the same time adequate considerations are given to providing plans for other people to build houses and enjoy the environment.

To assist the Conservation District, planning bodies and others with information relative to projection trends the following tables are prepared to give a sketch of what the future might hold for this area of the county.

A brief description of terms used:

Medium - average or about what you might expect as far as growth is concerned.

High - Above average but somewhat consistent with the trends of the last few years or the national trends which indicate a much higher percentage growth rate for Montana compared with the national.

Low - below average or much less than would be expected.

COUNTY POPULATION PROJECTIONS, 1975-2000--Continued

Place	Series	Census			Projections					
		1950	1960	1970	1975	1980	1985	1990	1995	2000
JEFFERSON	Medium--	4,014	4,297	5,238	6,700	7,269	8,169	8,945	9,847	11,035
	High----				7,801	9,412	12,379	15,110	19,460	24,361
	Low-----				6,157	6,214	6,396	6,506	6,559	6,824
Boulder	Medium--	1,017	1,394	1,342	1,431	1,552	1,744	1,910	2,102	2,356
	High----				1,666	2,010	2,643	3,226	4,155	5,201
	Low-----				1,315	1,327	1,366	1,389	1,400	1,457
Whitehall	Medium--	969	898	1,035	1,178	1,277	1,436	1,572	1,730	1,939
	High----				1,371	1,654	2,175	2,656	3,420	4,282
	Low-----				1,082	1,092	1,124	1,143	1,153	1,200
YELLOWSTONE	Medium--	55,875	79,016	87,367	97,300	109,073	126,106	142,340	161,612	180,968
	High----				113,203	140,883	190,520	239,712	318,586	398,488
	Low-----				89,461	98,400	98,950	103,776	107,968	112,183
Billings	Medium--	31,834	52,851	51,581	63,729	71,440	82,596	93,229	105,852	118,530
	High----				74,145	92,274	124,786	157,006	208,666	261,000
	Low-----				58,595	61,175	64,809	67,971	70,716	73,477
SILVER BOW	Medium--	48,422	46,454	41,981	43,000	43,110	44,457	45,476	47,797	48,148
	High----				50,291	57,632	70,455	82,930	101,236	119,715
	Low-----				39,405	35,945	33,692	31,213	29,192	27,230
Butte	Medium--	33,251	27,877	23,368	24,153	24,215	24,972	25,544	26,286	27,044
	High----				28,249	32,271	29,575	46,582	56,864	67,244
	Low-----				22,134	20,190	18,925	17,532	16,397	15,295

COUNTY POPULATION PROJECTIONS, 1975-2000

Place	Series	Census 1950	Census 1960	Census 1970	Projections 1975	Projections 1980	Projections 1985	Projections 1990	Projections 1995	Projections 2000
LEWIS AND CLARK	Medium--	24,540	28,000	33,281	36,900	40,930	46,931	52,691	59,843	66,929
	High----				42,799	52,720	70,693	88,607	117,838	147,292
	Low-----				33,994	35,116	36,906	38,470	40,024	41,524
Helena	Medium--	17,581	20,227	22,730	24,799	27,507	31,541	35,412	40,218	44,980
	High----				28,764	35,431	47,510	59,549	79,194	98,988
	Low-----				22,846	23,600	24,803	25,854	26,899	27,907
East Helena	Medium--	1,216	1,490	1,651	1,830	2,030	2,327	2,612	2,967	3,319
	High----				2,122	2,614	3,506	4,393	5,843	7,304
	Low-----				1,685	1,741	1,830	1,907	1,984	2,059
CASCADE	Medium--	53,027	73,418	81,804	83,900	85,112	88,274	90, 658	92,496	94,773
	High----				96,390	110,038	126,149	139,150	157,000	175,000
	Low-----				77,747	72,827	69,872	66,398	62,812	59,645
Great Falls	Medium--	39,124	55,357	60,091	61,262	62,147	64,455	66,197	67,539	69,201
	High----				70,382	80,347	96,959	112,894	134,868	157,446
	Low-----				56,769	53,176	51,019	48,482	45,864	43,552
GALLATIN	Medium--	21,902	26,045	32,505	37,300	40,501	44,058	47,158	51,037	55,394
	High----				42,390	50,588	61,840	72,477	88,066	104,451
	Low-----				34,771	35,478	36,218	36,608	37,169	38,111
Bozeman	Medium--	11,325	13,361	18,670	22,130	24,029	26,139	27,978	30,279	32,864
	High----				25,149	30,013	36,689	42,999	52,248	61,969
	Low-----				20,629	21,049	21,488	21,719	22,051	22,611

COUNTY, CITY ESTIMATES

	1970	1971	1972	1973	1974	1975
Lewis & Clark---	33,281	34,200	34,800	36,100	36,300	36,900
Helena--------	22,730	23,257	23,444	24,651	24,897	24,799
Cascade---------	81,804	84,200	84,200	84,800	84,700	84,700
Great Falls---	60,091	61,619	61,305	62,117	61,749	62,256
Gallatin--------	32,505	33,800	35,000	36,000	36,800	38,800
Bozeman-------	18,670	18,640	19,512	20,681	21,764	22,846
Jefferson-------	5,238	5,500	6,200	6,400	6,700	7,300
Whitehall-----	1,035	1,181	1,326	1,285	1,244	1,266
Boulder-------	1,342	1,381	1,420	1,459	1,498	1,538
Silver Bow------	41,981	42,900	42,100	43,300	43,100	43,300
Butte---------	23,368	24,065	32,312	24,841	24,242	24,265
Yellowstone-----	87,367	89,800	91,000	93,200	95,600	97,400
Billings------	61,581	62,160	62,662	62,318	63,782	63,729
Broadwater------	2,526	2,600	2,600	2,700	2,700	2,800
Townsend------	1,371	1,408	1,420	1,377	1,456	1,528

COUNTY POPULATION PROJECTIONS, 1975-2000--Continued

		Census			Projections					
Place	Series	1950	1960	1970	1975	1980	1985	1990	1995	2000
BROADWATER	Medium--	2,922	2,804	2,526	2,800	3,011	3,428	3,822	4,334	4,844
	High----				3,245	3,892	5,197	6,489	8,626	10,776
	Low-----				2,585	2,572	2,682	2,768	2,875	2,977
Townsend	Medium--	1,316	1,528	1,371	1,528	1,643	1,870	2,086	2,365	2,643
	High----				1,771	2,124	2,835	3,541	4,706	5,880
	Low-----				1,441	1,404	1,464	1,510	1,569	1,624

Medium series is slightly higher than projected U.S. growth rate.

HISTORICAL CENSUS DATA

By County

	1900	1910	1920	1930	1940	1950	1960	1970
Lewis & Clark-----	19,171	21,853	18,660	18,224	22,131	24,540	28,006	33,281
Cascade-----------	25,777	28,883	38,836	41,146	41,999	53,027	73,418	81,804
Gallatin----------	9,553	14,079	15,864	16,124	18,269	21,902	26,045	32,505
Jefferson---------	5,330	5,601	5,203	4,133	4,664	4,014	4,297	5,238
Silver Bow--------	47,635	56,848	60,313	56,969	53,207	48,422	46,454	41,981
Yellowstone-------	6,212	22,944	29,600	30,785	41,182	55,875	79,016	87,367
Broadwater--------	2,641	3,491	3,239	2,738	3,451	2,922	2,804	2,526

MONTANA POPULATION

Distributed by Age Groups

Year	Total	0-4	5-14	15-24	25-44	45-64	65+
1880---	39,000	4,000	6,000	7,000	17,000	5,000	500
1890---	143,000	13,000	19,000	25,000	57,000	15,000	2,000
1900---	243,000	24,000	44,000	41,000	95,000	30,000	5,000
1910---	376,000	38,000	64,000	73,000	137,000	52,000	9,000
1920---	549,000	67,000	111,000	83,000	185,000	84,000	17,000
1930---	538,000	49,000	110,000	94,000	156,000	101,000	27,000
1940---	559,000	49,000	93,000	102,000	82,000	122,000	36,000
1950---	591,000	68,000	102,000	82,000	170,000	118,000	51,000
1960---	675,000	83,000	144,000	90,000	167,000	125,000	65,000
1970---	694,000	57,000	151,000	122,000	155,000	141,000	69,000

PROJECTED GROWTH RATES

Montana and the United States

	Montana			United States		
Years	High	Med.	Low	High	Med.	Low
1970-1980	20.6	13.3	2.8	10.3	9.3	8.6
1980-1990	18.4	16.7	7.8	13.7	9.6	7.0
1990-2000	16.4	16.4	7.1	11.0	6.9	4.0

These rates indicate that a medium for Montana will continue at a rate somewhat greater than the total U.S. growth rate.

The high and low rates are based on past growth patterns.

AGRICULTURAL STATISTICS - LEWIS AND CLARK COUNTY*

Cash Receipts
(From sale of Principal Products & Government Payments)

Year	Livestock Products and Livestock	Crops	Government Payments	Cash Receipts per Farm	Number of Farms
1976--	$7,503,000	$2,995,000	$353,000	$38,208	284
1977--	$9,173,000	$2,585,000	$494,100	$43,758	280

Agricultural Crop Production

	Irrigated		Non-Irrigated	
Year	Acres Harvested	Yield (bu/acre)	Acres Harvested	Yield (bu/acre)
Winter wheat				
1976--	100	35.0	8,300	28.0
1977--	100	38.0	7,600	23.5
Spring wheat				
1976--	2,200	42.0	5,600	36.5
1977--	200	40.0	1,800	20.0
Barley				
1976--	5,700	56.0	2,700	38.3
1977--	8,800	53.0	2,600	30.0
Oats				
1976--	1,600	51.0	600	36.5
1977--	1,300	65.4	500	30.0
All hay				
1976--	29,600	26.7	8,400	1.23
1977--	24,800	2,48	11,200	1.42
Alfalfa hay				
1976--	20,000	2.88	3,500	1.31
1977--	15,800	2.82	6,200	1.76

Livestock Numbers

Year	Milk Cows and Heifers	Beef Cows and Heifers	Sheep and Lambs
1976--	600	25,900	13,100
1977--	800	23,800	12,400

*Taken from Montana Agricultural Statistics, Volume XVII, County Statistics 1976 and 1977.

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IX OBJECTIVES AND GOALS

PLANNING AND DEVELOPMENT

The Conservation District will contribute significantly to the effectiveness of a resource planning program. Resource data contained in the plan and available from the District office can be of assistance to landusers in determining long-term effects of both urban and agricultural uses on those resources.

In resource planning and development, the sometimes apparent problems are not always the real problems but rather symptoms of several related problems. Each must be identified and dealt with in a manner that will treat the symptom and effect a cure.

In this section of the long range plan the problems relate to each major resource, and the opportunities which follow will list ways in which the Conservation District will work toward viable solutions to those problems.

Problems

1. The standard soil survey for the District is nearing 50 percent completion.
2. There is a need for coordinated planning between the public and private sectors.
3. There is a need for conservation planning efforts on lands that have primary resource problems identified.
4. There is a need for coordinated planning of development areas of the District as a basis for area comprehensive planning by local citizens.
5. Lands important to the agriculture base of the county need to be identified and efforts made to incorporate these concepts into area comprehensive planning efforts.

Opportunities

1. Work will continue toward the completion of a standard cooperative soil survey. Completion date is scheduled for 1984.
2. An interim Soil Survey Report will be published for the Helena Valley area to accommodate intensive growth patterns and serve as a guide in making sound resource planning decisions.
3. Work closely with the City-County planning boards to ensure coordination of programs and projects.
4. Provide the planning boards with inventory data on natural resources for their use in making planning decisions.

5. One Conservation District Supervisor will serve as a member of the county planning board.

6. Coordinate and make available to planning boards information of other agencies.

7. Develop a Conservation District Committee system to include Urban Supervisors, groups, and other interested persons to forward the efforts of the District in all resource activities.

8. The Conservation District will provide employees to work in all phases of planning and development activities.

9. Conservation District Supervisors will consistently identify areas of primary resource problems and direct planning efforts in that direction.

10. The Conservation District will encourage the use of long term agreements (A.C. Program), the Great Plains Conservation Program, the Rural Clean Water Program, and others in the development of conservation plans.

11. The Conservation District Supervisors will establish planning priorities that reflect the treatment needs of the land.

"Some crazy new idea--calls it contour farming."

Range Resources

The improvement of our environment and our water quality with the potential for increased income is available through better rangeland management. Ninety percent of the agricultural income is derived from the sale of livestock and livestock products.

Range improvements will directly reduce soil losses from wind and water erosion on rangeland. Water and air pollution will be minimized. Stream flow stabilization and a clean sediment-free water supply will result from improved range management.

Problems

1. Fifty percent of the private and state rangelands are in poor and fair range conditions (see Natural Resource Inventory section on Range). In addition, half of the remaining rangeland needs grazing management planning, fences, stockwater and etc. to be classed as adequately treated.

2. Lack of understanding of the rangeland resource by consumers, ranchers, and other users.

3. Lack of adequate water supplies to provide for efficient forage utilization during all seasons.

4. Economic losses due to the 50 percent condition of the rangelands.

5. Predator problems.

6. Competitive use of rangelands by livestock, wildlife and the recreationist.

7. Fragile lands contributing sediment due to lack of management.

8. Loss of forage production due to increased noxious weed infestations in portions of the District.

9. Poor land management such as overgrazing, lack of weed control, and failure to prevent erosion reduces agricultural production.

   Some of the reasons for poor management stem from small units that have insufficient income to apply adequate land treatments. Other reasons include rural residents without equipment or knowledge of land treatment and often with more livestock than their small acreage can support.

Opportunities

1. The Conservation District goals for a rangeland program have been outlined in the Natural Resource section of this report. In order to attain these goals the Conservation District will need to establish a coordinated effort with the Rangeland Resource Committee.

2. Encourage the rangeland resource to be considered in its proper perspective and coordinate with other land use planning agencies in the county.

3. Broadening the information and education program to develop a better understanding of the rangeland resource.

4. Encourage the use of well designed grazing systems to bring about improved range conditions and greater economic returns.

5. Encourage research that contributes to increased forage production and protection of the rangeland resource.

6. Encourage the use of tame pasture to increase forage production and early spring grazing to provide resting of native grasses during critical growing periods.

7. Planning priorities on easily erosive lands to reduce sediment production.

8. Encourage land users to use available technical assistance and cost-share programs to aid in the establishment of programs that protect the rangeland resource.

9. Fully recognize the economic potential for various types of recreational developments, especially in the area of fee hunting and vacation facilities on farms and ranches.

10. The District will cooperate with the E.P.A., Montana Department of Health and Environmental Sciences, and others in the development of radio and TV spots that discuss the importance of care and development of the rangelands.

Russian wildrye--a good use for marginal cropland.

Forest Resources

A major portion of the privately owned forest resources have been harvested at some time in the past. Inadequate contracts and poor harvest methods have caused many problems.

Management in the past has been directed almost exclusively to harvest operations rather than to sustained yield and multiple use management. The forest resources have a potential for wood products, forage production, clean water production, wildlife, and recreation.

Problems

1. Loss of revenue to landowners as a result of poor sale contracts.

2. Erosion and sedimentation caused by poor harvest operations.

3. Weed infestations as a result of inadequate harvest operations and lack of seeding of roads, skid trails, and landings.

4. Economic losses to landowners from loss of forage production during timber regrowth periods caused by lack of management planning prior to harvest.

5. Infringements on stream systems with subsequent impairments to water quality caused by improper harvest operations.

6. Loss of wildlife habitat due to improper logging techniques.

Opportunities

1. Develop an information and education program aimed at developing reasonable contracts, the need for advanced management planning, slash disposal, and weed and erosion control through seeding of critical disturbed areas.

2. Inform landowners of services available from the State Division of Forestry, Conservation District, and the private consultant firms in management and harvest planning.

3. Encourage landowners to plan grazing activities that improve the grass resources.

4. Provide administrative assistance to landowners in complying with the provisions of the Sediment Control Ordinance.

5. Provide technical assistance to landowners in planning and applying erosion control measures and practices that make significant contributions to improvement in water quality.

6. Encourage research which assists the landuser in better methods of timber management and harvesting techniques.

Water Resources

The growth of a community, industrial developments, expanded recreational and wildlife development, and a productive agriculture are all dependent on adequate quantities of high quality water. Efforts to improve water quality have been instituted by the Conservation District in cooperation with state and federal agencies. Water quality will be improved as programs are instituted to make adequate quantities available for all users.

Problems

1. Periodic excessive runoff from snow melt damages cropland, roads, bridges and urban related developments on the flood plains of the Conservation District.
2. Sediment loads caused by flood waters increasing silting of water storage impoundments, deposition in stream channels, and damage to fish and wildlife habitat.
3. Lack of adequate water storage impoundments for maintaining minimum stream flows and late season irrigation.
4. Improved irrigation water management, field drainage, land shaping or leveling needed on 50 percent of the irrigated lands in the District.
5. Rangeland management problems due to lack of adequate stockwater developments.
6. Excessive irrigation return flows contributing nutrient loads which increase pollution of streams and lakes.
7. Improperly placed irrigation diversions causing streambank erosion, unstable stream channels, and impairments to the overall stability of the stream system.

Opportunities

1. Storage of spring runoff water to offset temporal shortages for irrigation lands and maintenance of minimum stream flows for fish and wildlife purposes.
2. Encourage improvements and use of irrigation systems to adequately control water and promote better irrigation water management.
3. Integrate the resources of the total watershed area in the investigating and planning of water development projects.
4. Improved efficiency of agricultural and commercial forestry production by: improved land treatment, irrigation water management with sprinkler systems, water control structures, improved field ditches

and pipelines, improved range management, developing stockwater facilities, building fences, and improving tree growth by thinning and selective harvesting.

5. Reduction of streambank erosion by applying proper measures based on an overall stream system evaluation.

6. Provide incentives for the management of tailwater (return flows) from irrigation systems.

7. Encourage the protection and enhancement of the riparian vegetation along streams and lakes.

8. Encourage information and educational opportunities that describe the riparian river concepts with emphasis on the need for various forms of protective measures that insure improved water quality, improved fish and wildlife habitat, landscape beauty, and general overall improvement of the environment.

9. Acquaint water users with the impacts of late-season dewatering and flow reductions on aquatic habitats and the fisheries they support.

10. Discourage the discharge of sewage effluents and industrial pollutants into the lakes and streams of the District.

11. Provide leadership and administration of the Natural Streambed and Land Preservation Act.

12. Provide technical assistance in planning and application of approved treatment under the Natural Streambed and Land Preservation Act.

Sprinkler systems are improving irrigation water management.

Cropland, Hay and Pasture Resources

Economic pressures are expected to encourage landusers to intensify production, to modify established management systems and patterns, to expand irrigated acreages, and to bring new land into production.

The Conservation District urges these individuals and groups to consider all the available alternatives before making radical changes in their operations.

Problems

1. Many acres of low-producing old stands of irrigated hay and pasture.

2. Improper irrigation water management and inadequate irrigation systems limiting production on many acres.

3. Saline seep on an estimated 200 acres of cropland. These acres are affected to the point of total loss of crop production.

4. Restrictions placed on effective chemicals for weed and insect control.

5. Stripcropping and associated protection practices needed on 10,000 acres to effectively control wind and water erosion. Changes in cropping systems along with larger machinery has resulted in a tendency to destroy certain practices that were effectively controlling erosion.

6. Grass waterways needed to effectively control erosion on 50 percent of the cropland in the District.

7. Marginal cropland which needs to be converted to permanent vegetation to control erosion.

8. Pasture and hayland which needs to be fertilized in accordance with soil testing recommendations for top production potentials.

9. Land under irrigation which is low in water-holding capacity and high in infiltration resulting in high usage of water with low production. This problem can be solved by the conversion to sprinkler systems to increase efficiency and improve production.

10. Production limited on many acres by too intensive grazing.

Opportunities

1. Encourage the cropping and reseeding of old low-producing stands of pasture with improved higher-producing, better adapted plant varieties.

2. Encourage production increases as a result of improved irrigation water management, improved irrigation systems, and installation of adequate drainage systems.

3. Encourage the use of crop-rotation systems that rotate hay and pasture fields on a 6-8 year cycle. This will increase production of these acres at a higher level.

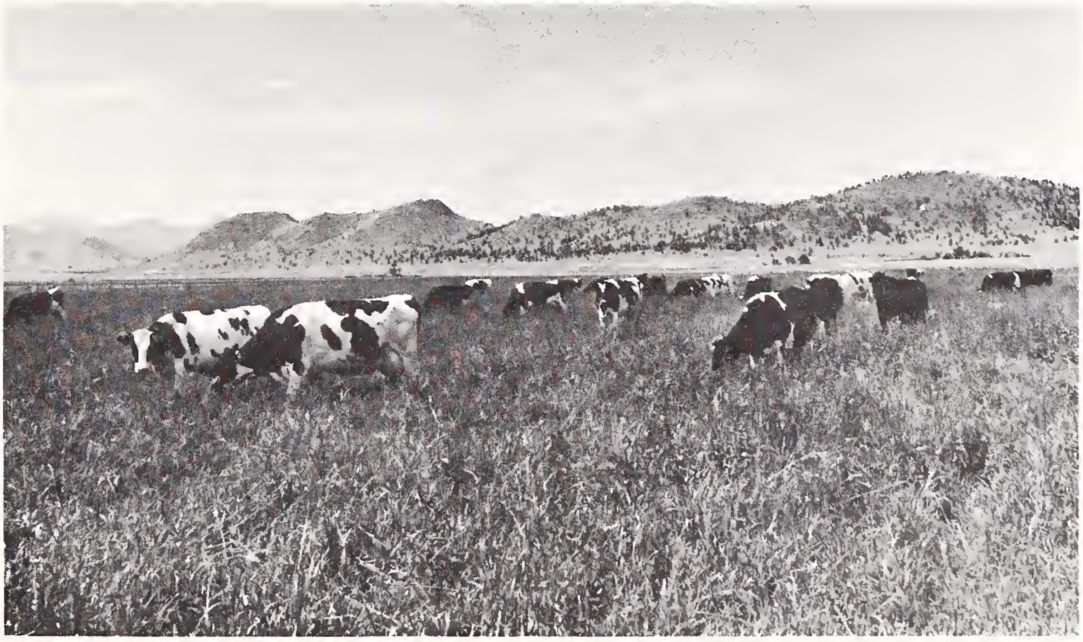
4. Encourage the installation of irrigation systems in accordance with adequate, efficient, and properly planned systems.

5. Encourage the installation of conservation cropping systems on all cropland areas using wind stripcropping, contour stripcropping, and residue management in a combination that effectively solves wind and water erosion.

6. Encourage the installation of grass waterways, diversions, and water control structures as an effective means of reducing erosion from cropland and pasture fields.

7. Review all conservation planning requests and establish priorities that direct efforts toward the solution of primary resource problems.

8. Administer the Conservation District Sediment Control Ordinance to effectuate needed solutions to critical erosion problem areas when voluntary efforts fail.



Improved pasture stand.

Fish and Wildlife Resources

Fish and wildlife are important resources in the District. With the increased growth of outdoor-oriented recreation, this resource will become an even more important consideration in the overall resource development program in the District.

Problems

1. A few careless and irresponsible people causing poor relations between landowners and sportsmen.

2. No active local sportsmen's group to establish a liaison between landowner and sportsman.

3. Inadequate public access and developed facilities for existing fish ponds.

4. More pressures being placed on private land each year for hunting.

Opportunities

1. Inform landowners of potential for various types of recreational developments, especially in the areas of fee hunting, guide service, and vacation farms and ranches.

2. Encourage where practical the development of wildlife habitat areas in conservation planning.

3. Consider items beneficial to wildlife development in the design of conservation practices such as fencing of structures, selection of species adapted to providing food and cover for wildlife, etc.

4. Establish a better liaison between various agencies during the early planning stages of road design in order that more consideration can be given to the development of water impoundment areas suitable for fisheries.

5. Sponsor programs designed to promote better relation between sportsmen and landowners.

Urban Lands

Portions of the Conservation District are included in the municipality of Helena and East Helena and are also included in this definition. Agricultural and other lands that have been subdivided, if not properly treated, become sources of sediment production and areas for noxious weed infestations.

Problems

1. These lands, without proper planning and application of conservation treatment, can be a major source of sediment pollution to rivers and streams.
2. These lands, without proper treatment, provide excellent sites for noxious weed infestations.
3. Significant acreage in the Helena Valley is infested with Russian knapweed.
4. Soil Survey data needs to be encouraged for developers, planners, and other community leaders.
5. Standards and specifications are needed to insure the planning and application of sediment and erosion control measures in developing areas.
6. Training is needed for consulting engineers, developers, and others in the planning and application of acceptable sediment and erosion control measures.

Opportunities

1. Encourage the selection of sites where drainage patterns, topography, and soils are favorable for the intended use.
2. Encourage the installation of appropriate erosion control practices in the site development plan.
3. Encourage developers to use poorly suited areas for open space and recreation.
4. Encourage the development of larger tracts in workable units on which construction can be completed rapidly.
5. Encourage the protection of critical areas during construction with mulch, temporary cover crops, and with mechanical measures such as diversions, waterways, etc.
6. Encourage the construction of sediment basins to detain runoff and trap sediment during construction.

7. Provide an Interim Soil Survey report to all persons, groups, planning organizations, developers, etc., involved in making land use decisions.

8. Conduct group training sessions in the use of soil survey data.

9. Prepare Conservation District standards and specifications for various solutions to erosion problems in the District.

10. Conduct information and education meetings in the use of standards and specifications and in the development of sediment and erosion control plans for developing areas.

11. Establish a close working relationship with county commissioners, area planning staff, planning boards (city and county), and others to insure compliance with all provisions of the Sediment Control Ordinance.

12. Provide technical assistance to developers and others in the preparation of acceptable erosion and sediment control plans.

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X IMPLEMENTATION

IMPLEMENTATION

There are numerous techniques for implementing different elements of the Conservation District program. However, the use of each technique will be specifically fitted to the policies, goals, and objectives of the District. It will be especially helpful if the same people and groups who assisted in the development of this Long Range Program are utilized in carrying it through. The District must exercise strong leadership and utilize all possible assistance available if we are to have a successful program. We must seek out and receive excellent cooperation from all agencies.

Certain tools will be utilized in implementing the District's Long Range Program including the following:

1. Certain surveys, investigations, and research will be conducted relating to the character of soil erosion, floodwater, and sediment damage; the conservation, development, utilization, and disposal of water and the preventive and control measures and works of improvement will be needed; and information will be gathered concerning preventive and control measures and works of improvement.

2. Conservation projects relating to the soil, vegetation, and water resources of the District will be instigated with consent of the owner of the land, except under the provisions of the Sediment Control Ordinance #77-01 "Complaint" section.

3. Preventive and control measures and works of improvement for flood prevention and the conservation, development, utilization, and disposal of water within the District include, but are not limited to, engineering operations, range management, methods of cultivation and growing of vegetation, and changes in the use of land.

4. The District may cooperate with or enter into agreements with any agency or land occupier within the District within the limits of appropriations duly made available by law in the carrying out of erosion control and prevention operations and in implementing works of improvement for flood prevention and the conservation, development, utilization, and disposal of water, subject to such conditions as the supervisors deem necessary.

5. The District may obtain options upon and acquire by purchase, exchange, lease, gift, grant, bequest, devise, or otherwise, any property, real or personal, or rights or interests therein, and all such property shall be exempt from taxation by the state or any political subdivision thereof, to maintain, administer, and improve any properties acquired, to receive income from such properties, and to expend such income in carrying out the purposes and provisions of this plan; and it may sell, lease,

or otherwise dispose of any of its property or interests therein in furtherance of the purposes of this plan.

6. The District may make available on such terms as it shall prescribe to land occupiers within the District the following items and services: agricultural and engineering machinery and equipment, fertilizer, seeds and seedlings, and other material or equipment that will assist land occupiers in their operations for the conservation of soil resources and for the prevention and control of soil erosion, flood prevention, and conservation, development, utilization, and disposal of water.

7. The District may construct, improve, operate, and maintain such structures as may be necessary or convenient for the performance of any of the operations authorized in this plan.

8. Comprehensive plans will be developed for the conservation of soil resources and for the control and prevention of soil erosion, flood prevention, and the conservation, development, utilization, and disposal of water within the District.

9. The District may accept donations, gifts, and contributions in money, materials, or otherwise for the purpose of carrying out its operations of soil conservation, flood prevention, drainage, irrigation, water management, and erosion control and prevention within the District.

10. The District shall monitor the activities regulated by the Natural Streambed & Land Preservation Act of 1975 and shall, if necessary, file charges and recommend prosecution of violators in civil court.

11. The District will actively carry out the provisions of the Federal Clean Water Act in cooperation with the Montana Department of Health & Environmental Sciences and the Environmental Protection Agency.

12. The District will assist the Soil Conservation Service in carrying out the provisions of the Resources Conservation Act of 1977.

13. The District will develop land use regulations.

14. Agreements or contracts will be made with cooperating agencies in implementing conservation programs of the District.

15. An annual plan of work will be developed based upon the long range program goals and objectives for the annual operation of the District. The Board of Supervisors will review the Long Range Program in developing this annual work plan which will be designed to carry out the long range objectives.

The annual work plan will list, by priority, the objectives for the coming year and methods proposed for accomplishing these objectives. During the review of the Long Range Program in developing the annual work plan any additions, deletions, or changes deemed appropriate at that time will be incorporated into the Long Range Plan.

16. The concept of zoning will be considered within the District to provide an effective conservation program. Zoning is described as an exercise of police power. For example, the state has the power to regulate in the interests of the health, safety, and general welfare of the public. Some purposes of zoning would be environmental preservation, limitation of congestion, protection of property values, and adequate provision of community services. The County Commissioners may establish zones or districts for different uses of land and may regulate development patterns, building use, and areas around buildings.

    Section 16-4704, R.C.M., provides that zoning regulations must be in accordance with the comprehensive plan. Comprehensive ordinances apply to an entire planning area and the absence of such a plan may place the zoning ordinance in questionable legal status. If a jurisdiction is experiencing emergency land use problems, a temporary interim zoning regulation may be enacted pending the completion of a comprehensive plan within a reasonable time frame. Such authority is provided to the County Commissions by Section 16-4711, R.C.M. 1947.

17. The District will continue **implementation and administration** of the Sediment Control Program under the authority of the State Conservation District Act. An erosion and sediment control plan will be prepared to guide developers in overall planning for developing areas. Plans for controlling erosion relating to timber harvesting actiities will be prepared to guide timber harvesters. **(See Appendix, Exhibits 2, 3, & 4.)**

    Farmers and ranchers will be encouraged to update existing plans for adequacy in controling erosion and sedimentation. Violators of the Sediment Control Ordinance are subject to investigation. Recommendations for improved practices may be presented. Operators have the opportunity under the ordinance provisions to voluntarily implement solutions. Noncooperating violators may be prosecuted as provided by the ordinance.

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RESOLUTION OF ADOPTION

WHEREAS the Board of Supervisors, consisting of Chairman Frank C. Thompson, Vice-Chairman Roland Mosher, and Members Frank Schatz, Robert Simpson, and Wesley Johnson, met in special session on February 6, 1979 for the purpose of final review of the Long Range Program for Total Resource Conservation in the Lewis & Clark County Conservation District and agreed that this program be used by the District in its continuing effort to maintain and improve the resources of the County;

THEREFORE BE IT RESOLVED that on this sixth day of February in the year Nineteen Hundred Seventy Nine, we the elected Supervisors, of the Lewis & Clark County Conservation District, State of Montana, United States of America, do unanimously adopt these materials as the Conservation District Long Range Program for Total Resource Conservation.

Frank C. Thompson
Frank C. Thompson, Chairman

Robert Simpson
Robert Simpson, Member

Roland Mosher
Roland Mosher, Vice-Chairman

Wesley N. Johnson
Wesley Johnson, Member

Frank Schatz
Frank Schatz, Member

ATTESTED TO:

Cathi J. Love
Cathi J. Love, Secretary

February 6, 1979
Date

XI SOURCES OF INFORMATION

SOURCES OF INFORMATION

Information was contributed by or obtained from the following agencies and publications:

1. Montana Department of Fish & Game.
2. Montana Department of Natural Resources & Conservation, Technical Services Bureau, Geology Section.
3. Montana Department of Health & Environmental Sciences, Water Quality Bureau.
4. Montana Department of State Lands.
5. United States Weather Bureau, State Climatologist.
6. An Appraisal of Potential Outdoor Recreational Developments in Lewis & Clark County (Lewis & Clark County Technical Action Panel).
7. Lewis & Clark County Parks & Recreation Element (1975, Lewis & Clark County Commissioners, City-County Planning Board, Lewis & Clark County Parks & Recreation Citizens' Advisory Board).
8. Lewis & Clark County Situation Statement-1972 (Lewis & Clark County Committee for Rural Development).
9. Subdivision Regulations, Lewis & Clark County (1974).
10. Water Resources Survey, Lewis & Clark County (1965).
11. Montana Agricultural Statistics (1976 & 1977).
12. Montana Rangeland Resource Program (DNRC, 1977).
13. Montana Soil & Water Conservation Needs Inventory (SCS, 1970).
14. Montana State Conservation District Law, R.C.M. 1947.
15. Montana Statewide Conprehensive Outdoor Recreation Plan (SCORP) (Montana Department of Fish & Game, 1978).
16. Montana Population Estimates 1950-1975 (Division of Research & Information Systems, Helena, 1976; Montana Department of Community Affairs).
17. Montana Population Projections 1975-2000 (Division of Research & Information Systems, Helena, 1977; Montana Department of Community Affairs).

18. River Mile Index of the Missouri River (DNRC, 1979).

19. Conservation Districts and 208 Water Quality Management (EPA and NACD, 1977).

20. Water in Urban Planning, Salt Creek Basin (Illinois Geological Survey, Water Supply Paper 2002).

21. Hydrology for Urban Land Planning (Geological Survey Circular 554).

22. Comprehensive Erosion & Sediment Control Training Program (Virginia Soil & Water Conservation Commission, 1976).

23. Nonpoint Source Control Guidance, Silviculture (Technical Guidance Memo. 37, U.S. EPA, 1977).

24. Nonpoint Source Control Guidance, Construction Activities (U.S. EPA, 1976).

25. Soil Erosion & Sedimentation Control Manual for Agriculture (Pennsylvania Department of Environmental Resources, 1975).

26. Suggested Guidelines & Standards for Erosion and Sediment Control Programs (NACD, 1972).

27. Soil Erosion & Sediment Control Manual (Pennsylvania Department of Environmental Resources, 1974).

28. Guidelines for Erosion & Sediment Control Planning & Implementation (U.S. EPA-R2-72-015, 1972).

29. Environmental Impact of Land Use on Water Quality (U.S. EPA G005103).

30. Directory of Soil Erosion & Sedimentation Control Practices (Pennsylvania Department of Environmental Resources).

31. Nonpoint Source Pollution Control (Idaho Division of Environment, 1977).

32. Processes, Procedures, and Methods to Control Pollution Resulting from All Construction Activity (U.S. EPA 430/9-73-007).

33. Residential Erosion & Sediment Control (Urban Land Institute, 1200 18th Street NW, Washington DC 20036).

34. Roadside Vegetation in Montana (Department of State Highways, 1974).

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XII RIVER MILE INDEX

RIVER MILE INDEX OF THE MISSOURI RIVER IN LEWIS AND CLARK COUNTY

This index was prepared by the Water Resources Division of the Montana Department of Natural Resources and Conservation.

The Conservation District believes these measurements by river miles will serve for such purposes as water rights descriptions, scientific investigations, administration of the Natural Streambed & Land Preservation Act, and provide resource information for programs relating to water quality.

All distances in this inventory are measured from the river mouth upstream. The designation "right bank" or "left bank" is given to identify the position of the stream in relation to the main stream as it would appear to an observer facing downstream.

Example:

2,197.3		Dearborn River (L bank)
	3.0	Paul Creek (L bank)
	12.3	Sullivan Creek (L bank)
	5.9	Little Trout Creek (L bank)

2,197.3 miles is the distance from the mouth of the Missouri to the Dearborn River outlet, and entering on the left bank 3.0 miles is the distance from the mouth of the Dearborn to Paul Creek entering on the left bank. 12.3 miles is the distance from the mouth of the Dearborn to Sullivan Creek entering on the left bank. 5.9 miles is the distance from the mouth of Sullivan Creek to Little Trout Creek entering on the left bank.

A complete review of this information will provide a good overview of the river and stream systems in the Conservation District and a concept of the distances involved in planning programs for assisting in improving these systems.

MISSOURI RIVER

- 2,121.5 Sun River (L bank)
  - 22.4 Fourmile Creek (R bank)
  - 30.2 B.N. Railroad bridge
  - 30.4 Highway #200 bridge at Sun River, Mt.
  - 30.5 U.S.G.S. gaging station #6-0875
  - 36.4 Adobe Creek (R bank)
  - 37.4 County road bridge near Fort Shaw, Mt.
  - 37.5 U.S.G.S. gaging station #6-0860
  - 44.9 U.S.G.S. gaging station #6-0858 (L bank)
  - 45.0 County road bridge near Simms, Mt.
  - 45.7 Simms Creek (R bank)
    - 6.9 North Fork Simms Creek (L bank)
    - 7.0 South Fork Simms Creek (R bank)
  - 48.1 Anderson Coulee (R bank)
  - 49.4 County road bridge
  - 51.6 Loomis Coulee (R bank)
  - 58.1 Headgate Crown Butte Canal (R bank)
    - 0.9 U.S.G.S. gaging station #6-0850
    - 10.0 U.S.G.S. gaging station #6-0855
  - 58.2 Dry Creek (R bank)
  - 64.3 Spring Creek (R bank)
  - 65.5 Elk Creek (R bank)
    - 2.2 B.N. Railroad bridge
    - 2.4 Meyer Lake outlet channel (R bank)
    - 3.9 Lower end Hogan Slough (R bank)
    - 5.5 Highway #21 bridge near Augusta, Mt.
    - 8.7 Highway #287 bridge at Augusta, Mt.
    - 8.8 U.S.G.S. gaging station #6-0845
    - 11.9 Upper end Hogan Slough (R bank)
    - 14.7 Smith Creek (L bank)
      - 0.1 Highway #434 bridge
      - 3.1 Florence Canal dam and headgate (R bank)
        - 0.1 D.N.R. & C. gaging station #41K 05000 (L bank)
      - 3.7 East Canal tailout (L bank)
        - 0.5 D.N.R. & C. gaging station #41K 04080 (R bank)
        - 3.3 D.N.R. & C. gaging station #41K 04000 (R bank)
        - 3.4 Nilan Reservoir East dam - D.N.R.& C.
      - 4.9 U.S.G.S. gaging station #6-0840
      - 6.0 Smith Lake Outlet channel (R bank)
      - 7.6 Ford Creek (L bank)
        - 3.4 Nilan Supply Canal crossing
          - 1.0 D.N.R. & C. gaging station #41K 02080 (R bank)
        - 9.1 U.S.G.S. gaging station #6-0835
        - 12.2 North Fork Ford Creek (L bank)
        - 13.1 Red Creek (L bank)
        - 13.2 Double Falls

- 2,121.5 Sun River (L bank) Continued
  - 65.5 Elk Creek (R bank)
        - 14.0 Whitewater Creek (R bank)
        - 14.3 Squirrel Creek (L bank)
      - 12.3 Nilan Supply Canal dam & headgate
        - 5.0 D.N.R. & C. gaging station #41K 03080 (R bank)
      - 14.0 U.S.G.S. gaging station #6-0825
      - 17.2 Petty Creek (L bank)
      - 19.0 Moudess Creek (L bank)
      - 19.7 Jakie Creek (L bank)
      - 21.2 Weasel Creek (L bank)
      - 22.3 Star Creek (L bank)
      - 22.4 Sixmile Creek (L bank)
    - 17.1 Highway #434 bridge
    - 19.3 Swallow Canyon (L bank)
    - 20.7 Blubber Creek (L bank)
    - 22.7 Hay Coulee (R bank)
    - 26.9 Cyanide Creek (R bank)
      - 0.9 East Fork Cyanide Creek (R bank)
    - 27.6 Sawmill Creek (L bank)
    - 29.1 Lead Gulch (L bank)
    - 29.4 Bailey Creek (R bank)
    - 30.2 Horse Creek (L bank)
    - 30.3 Cataract Creek (R bank)
    - 30.5 Short Creek (R bank)
    - 31.0 Bunch Grass Creek (R bank)
  - 66.2 Cutting Shed Coulee (L bank)
  - 71.3 Highway #287 bridge near Augusta, Mt.
  - 71.4 U.S.G.S. gaging station #6-0822 (L bank)
  - 74.1 Headgate Flowerree Canal (L bank)
    - 2.4 U.S.G.S. gaging station #6-0810
  - 74.2 Willow Creek (R bank)
    - 2.8 Willow Creek Dam & Reservoir
    - 5.9 U.S.G.S. gaging station #6-0815
    - 6.0 North Fork Willow Creek (L bank)
      - 5.0 Barr Creek (L bank)
        - 3.7 Rose Creek (R bank)
      - 7.6 Cutrock Creek (L bank)
        - 0.3 Eddie Creek (L bank)
          - 0.4 Shed Creek (L bank)
    - 8.5 Nilan North Canal tailout (R bank)
      - 0.1 D.N.R. & C. gaging station #41K 03000 (R bank)
      - 1.2 Nilan Reservoir North dam - D.N.R.& C.
    - 17.4 Little Willow Creek (L bank)
  - 94.7 Buttloph Creek (R bank)
  - 96.4 U.S.G.S. gaging station #6-0809
  - 97.3 Diversion Lake & Pishkun Supply Canal headgate (R bank)
  - 97.4 U.S.G.S. gaging station #6-0800
  - 98.0 Home Gulch (R bank)
  - 98.7 Hannan Gulch (R bank)
  - 99.2 French Gulch (R bank)
  - 99.7 Norwegian Gulch (R bank)

- 2,121.5 Sun River (L bank) Continued
  - 100.6 Beaver Creek (R bank)
    - 3.9 Cutreef Creek (R bank)
    - 4.5 West Fork Beaver Creek (L bank)
  - 100.8 Gibson Dam & Reservoir
  - 101.7 Leavitt Creek (R bank - into reservoir)
    - 0.4 Dry Fork (R bank)
    - 0.6 Lange Falls
    - 3.3 Stovepipe Creek (R bank)
  - 104.8 Neal Creek (R bank)
  - 106.3 South Fork Sun River (R bank)
    - 0.7 Furman Creek (L bank)
    - 1.0 U.S.G.S. gaging station #6-0790
    - 1.6 Bear Creek (L bank)
    - 1.8 Goat Creek (L bank)
    - 2.9 Windfall Creek (R bank)
    - 6.0 Prairie Creek (L bank)
    - 7.5 West Fork South Fork Sun River (L bank)
      - 1.9 Elk Creek (L bank)
      - 3.0 Nineteen Creek (R bank)
      - 6.4 Reef Creek (L bank)
      - 8.3 White Bear Creek (L bank)
      - 8.5 Ahorn Creek (R bank)
        - 1.3 Blind Fork (L bank)
        - 3.1 Lost Fork (L bank)
        - 3.2 East Fork (R bank)
      - 9.6 Indian Creek (R bank)
      - 10.2 Black Bear Creek (L bank)
      - 12.2 No Name Gulch (L bank)
      - 12.4 Red Butte Creek (R bank)
      - 12.8 Grizzley Gulch (L bank)
      - 13.9 Pine Creek (R bank)
      - 15.3 Burnt Creek (R bank)
    - 8.2 Bighead Creek (R bank)
    - 10.4 Deer Creek (L bank)
    - 11.5 Burned Creek (L bank)
    - 12.3 Straight Creek (R bank)
      - 0.9 Benchmark Creek (R bank)
        - 0.1 Glade Creek (L bank)
      - 1.2 Wood Creek (R bank)
        - 1.3 Fairview Creek (R bank)
          - 3.5 Blackrock Creek (R bank)
          - 4.1 Renshaw Creek (R bank)
        - 3.6 Mule Creek (R bank)
        - 4.9 Lick Creek (R bank)
        - 6.1 Green Timber Creek (R bank)
      - 7.5 Park Creek (R bank)
      - 8.4 Elbow Creek (L bank)
      - 10.3 Crown Creek (R bank)
      - 10.4 Bunyan Creek (L bank)
      - 11.0 Cigarette Creek (L bank)
      - 11.3 Green Fork (L bank)

- 2,121.5 Sun River (L bank) Continued
  - 106.3 South Fork Sun River (R bank)
    - 15.7 Hoadley Creek (L bank)
    - 17.6 Ellis Creek (L bank)
    - 21.2 Loaf Creek (L bank)
  - 106.4 North Fork Sun River (L bank)
    - 1.0 U.S.G.S. gaging station #6-0785
    - 3.4 Freezeout Creek (R bank)
    - 5.5 Glenn Creek (R bank)
      - 2.3 North Fork Glenn Creek (L bank)
      - 2.4 South Fork Glenn Creek (R bank)
      - 0.4 Bridge Creek (R bank)
    - 8.9 Moose Creek (R bank)
      - 6.8 Alces Creek (R bank)
      - 9.0 Three Lakes Creek (R bank)
    - 12.1 Rock Creek (R bank)
      - 1.5 Red Shale Creek (L bank)
        - 0.6 Hoxsey Creek (R bank)
        - 3.3 South Fork Red Shale Creek (R bank)
      - 3.4 Miners Creek (L bank)
      - 6.1 Bald Bear Creek (L bank)
    - 14.2 Gates Creek (R bank)
  - 22.4 Lick Creek (R bank)
    - 3.8 North Fork Lick Creek (L bank)
    - 3.9 South Fork Lick Creek (R bank)
  - 26.6 Open Creek (R bank)
    - 1.3 South Fork Open Creek (R bank)

- 2,197.3 Dearborn River (L bank)
  - 3.0 Paul Creek (L bank)
  - 7.9 Sawmill Creek (L bank)
  - 8.3 Sheep Creek (L bank)
  - 12.3 Sullivan Creek (L bank)
    - 5.9 Little Trout Creek (L bank)
  - 12.9 Flat Creek (L bank)
    - 9.1 Twin Bridge Coulee (R bank)
    - 11.1 Slew Creek (L bank)
    - 11.4 Long Coulee (R bank)
    - 13.4 Willow Creek (L bank)
    - 15.1 Henry Creek (L bank)
    - 16.9 Myles Creek (L bank)
    - 17.9 Highway #200 bridge near Bowmans Corner
    - 18.6 Black Rock Creek (R bank)
    - 21.1 Hogan Creek (L bank)
    - 24.0 Highway #287 bridge near Bowmans Corner
  - 17.9 Deadman Creek (R bank)
  - 18.8 U.S.G.S. gaging station #6-0735 (R bank)
  - 19.0 Highway #287 bridge near Bowmans Corner
  - 22.8 Auchord Creek (L bank)
  - 26.0 South Fork Dearborn River (R bank)
    - 2.7 Jefferies Creek (L bank)
    - 3.3 Pruden Creek (R bank)
    - 3.4 Highway #434 bridge near Wolf Creek, Mt.

2,197.3					Dearborn River (L bank)
	26.0				South Fork Dearborn River (R bank)
		3.8			Borrell Creek (R bank)
		4.3			Game Coulee (R bank)
		5.0			Bessette Creek (L bank)
		5.9			Johnson Creek (L bank)
		6.5			Roberts Creek (R bank)
		7.1			Routt Creek (L bank)
		8.8			Cave Creek (L bank)
		10.6			West Prong (L bank)
		12.4			Dark Gulch (L bank)
	29.4				Highway #200 bridge near Bowmans Corner
	29.5				Middle Fork Dearborn River (R bank)
		2.4			Spring Gulch (R bank)
		2.5			Big Skunk Creek (L bank)
			2.7		Little Skunk Creek (R bank)
		2.6			Hardgrove Creek (L bank)
		6.0			Highway #200 bridge near Bowmans Corner
		6.9			Catherine Creek (R bank)
		7.0			Green Creek (L bank)
			0.3		Highway #200 bridge
			1.0		Bedrock Creek (L bank)
			3.5		North Fork Green Creek (L bank)
	34.1				Cuniff Creek (R bank)
		1.2			Wrangle Creek (R bank)
	41.3				Highway #434 bridge
	43.7				Bean Lake Outlet Channel (L bank)
	44.9				Clemons Creek (L bank)
		2.6			Pole Gulch (R bank)
	45.0				U.S.G.S. gaging station #6-0730 (R bank)
	47.1				Falls Creek (R bank)
		0.1			U.S.G.S. gaging station #6-0725
		3.1			Twin Butte Creek (L bank)
		3.6			East Fork Falls Creek (R bank)
			0.5		Blowout Creek (L bank)
		3.7			West Fork Falls Creek (L bank)
			1.0		Lone Pine Creek (R bank)
			2.3		Camp Creek (R bank)
				0.9	Middle Fork Camp Creek (L bank)
			3.5		Middle Fork Falls Creek (R bank)
	47.9				U.S.G.S. gaging station #6-0720
	51.6				Skull Gulch (R bank)
	52.1				Grizzly Creek (R bank)
	53.0				Rocky Stream (L bank)
	53.6				Milky Stream (L bank)
	54.1				No Grass Creek (R bank)
	55.2				Blacktail Creek (R bank)
		0.1			West Fork Blacktail Creek (L bank)
		0.5			East Fork Blacktail Creek (R bank)
		0.7			South Fork Blacktail Creek (R bank)
	56.5				Bear Creek (L bank)
	56.7				Whitetail Creek (R bank)

2,197.3 Dearborn River (L bank)
59.2 Twin Creek (R bank)
0.2 Lower Twin Creek (R bank)
0.3 Upper Twin Creek (L bank)
60.3 Lookout Creek (L bank)
60.6 Bald Bear Creek (R bank)
61.6 Lost Cabin Creek (R bank)
61.7 Pass Creek (L bank)
63.3 Welcome Creek (L bank)
66.0 Cave Creek (R bank)
66.9 Telephone Creek (L bank)

2,200.6 Stickney Creek (R bank)
3.4 North Fork Stickney Creek (R bank)
3.5 South Fork Stickney Creek (L bank)
5.4 Little Stickney Creek (R bank)
Wegner Creek (R bank)
7.7 Frazier Creek (L bank)
U.S.G.S. gaging station #6-0715 & County bridge at Craig, Mt.
Dog Creek, (L bank)
5.0 Moore Creek (R bank)
Billings Slough outlet channel (L bank)
Bray Gulch (R bank)
Rock Creek (L bank)
3.0 Highway #287 bridge near Wolf Creek, Mt.
5.6 Muddy Springs outlet channel (R bank)
6.0 Bridge Creek (R bank)
9.2 Wells Fork Rock Creek (R bank)
1.7 Willis Creek (R bank)
Little Prickly Pear Creek (L bank)
1.4 Long Gulch (R bank)
2.5 Lemline Gulch (R bank)
3.2 U.S.G.S. gaging station #6-0713 (R bank)
3.7 Wolf Creek (L bank)
3.1 Carter Creek (L bank)
4.0 Rogers Creek (R bank)
4.8 Gladstone Creek (R bank)
0.6 Bear Gulch (L bank)
4.9 Foster Gulch (R bank)
7.1 French Creek (R bank)
7.2 Lannigan Gulch (L bank)
8.5 Allen Gulch (L bank)
8.6 Woods Creek (R bank)
0.5 Greenpole Creek (R bank)
9.7 Denton Gulch (R bank)
5.0 Little Creek (L bank)
2.3 North Fork Little Creek (L bank)
0.1 Middle Fork Little Creek (L bank)
4.2 Albertson Gulch (L bank)
6.0 Sheep Creek (R bank)
1.6 West Sheep Creek (L bank)
3.9 Rose Gulch (L bank)

- 2,208.3 Little Prickly Pear Creek (L bank)
  - 9.9 Lyons Creek (L bank)
    - 4.6 North Fork Lyons Creek (L bank)
      - 3.2 Bear Gulch (R bank)
      - 4.8 Willet Gulch (R bank)
  - 10.2 Medicine Rock Creek (L bank)
  - 11.8 Spring Gulch (R bank)
  - 13.4 Clark Creek (R bank)
    - 0.2 Bear Gulch (R bank)
    - 0.3 Levings Gulch (R bank)
  - 14.2 U.S.G.S. gaging station #6-0711 (L bank)
  - 17.1 Big Sheep Creek (L bank)
    - 1.4 Glen Marie Gulch (R bank)
    - 3.4 Miners Gulch (R bank)
  - 18.4 Little Sheep Creek (L bank)
  - 22.3 Trinity Creek (R bank)
    - 0.7 Willow Creek (R bank)
  - 24.8 U.S.G.S. gaging station #6-0710
  - 25.6 Canyon Creek (L bank)
    - 2.5 Cottonwood Creek (R bank)
      - 0.1 U.S.G.S. gaging station #6-0705
      - 1.3 Sears Creek (L bank)
      - 4.2 Pikes Gulch (L bank)
    - 2.6 U.S.G.S. gaging station #6-0700
    - 4.2 Rattlesnake Creek (L bank)
    - 5.8 Big Mill Creek (L bank)
      - 1.3 Saw Mill Gulch (L bank)
    - 6.7 Virginia Creek (R bank)
      - 1.1 Trout Creek (L bank)
      - 1.9 Gould Creek (R bank)
        - 1.3 Bear Gulch (R bank)
      - 3.9 Stemple Creek (L bank)
      - 4.5 Fool Hen Creek (R bank)
      - 5.4 Rooster Bill Creek (L bank)
      - 6.0 Page Gulch (L bank)
      - 6.8 Gold Creek (L bank)
    - 7.1 Little Mill Creek (L bank)
    - 8.6 Tar Head Creek (R bank)
    - 10.5 Specimen Creek (R bank)
    - 11.2 Weino Creek (R bank)
  - 28.2 Meagher Gulch (L bank)
  - 28.4 Deer Creek (R bank)
  - 28.6 Missouri Gulch (R bank)
  - 30.0 Piegan Creek (R bank)
  - 31.6 Marsh Creek (L bank)
    - 2.5 U.S.G.S. gaging station #6-0690
    - 3.5 North Fork Marsh Creek (L bank)
  - 33.1 Ogilvie Gulch (L bank)
  - 33.8 U.S.G.S. gaging station #6-0685
  - 34.3 Cellar Gulch (L bank)
  - 34.4 Lost Horse Creek (R bank)
    - 1.1 Deadman Creek (L bank)
      - 0.7 U.S.G.S. gaging station #6-0675
      - 0.8 Cottonwood Gulch (R bank)

2,208.3				Little Prickly Pear Creek (L bank)
	34.4			Lost Horse Creek (R bank)
			2.8	Left Hand Fork Deadman Creek (R bank)
		1.6		U.S.G.S. gaging station #6-0680
		2.3		Dry Gulch (L bank)
			0.2	Right Hand Fork Dry Gulch (L bank)
			0.3	Left Hand Fork Dry Gulch (R bank)
		3.1		Empire Creek (R bank)
		3.9		Jerusha Gulch (L bank)
		4.3		Towsley Gulch (R bank)
		4.6		Friday Gulch (R bank)
	34.6			U.S.G.S. gaging station #6-0670
	35.4			North Fork Little Prickly Pear Creek (L bank)
		1.1		McQuithy Gulch (R bank)
	35.5			South Fork Little Prickly Pear Creek (R bank)
		2.1		Beartrap Gulch (L bank)
2,210.7				U.S.G.S. gaging station #6-0665 (L bank)
2,211.1				Holter Dam and Power Plant
2,211.6				Burke Creek (R bank - into Holter Lake)
2,212.5				Log Gulch (L bank - into Holter Lake)
2,212.6				Falls Gulch (L bank - into Holter Lake)
2,214.8				Log Gulch (R bank - into Holter Lake)
2,220.4				Cottonwood Creek (R bank X into Holter Lake)
2,225.8				Willow Creek (R bank - into Holter Lake)
	1.6			Elkhorn Creek (R bank)
		8.7		Camp Gulch (L bank)
	6.6			Candle Gulch (L bank)
		0.4		Slip Gulch (L bank)
2,226.9				Mann Gulch (R bank - into Holter Lake)
2,227.8				Meriwether Canyon (R bank - into Holter Lake)
	0.4			Picnic Canyon (L bank)
2,228.5				Coulter Canyon (R bank - into Holter Lake)
2,229.2				Fields Gulch (R bank - into Holter Lake)
2,232.0				Towhead Gulch (L bank - into Holter Lake)
	0.4			McLeod Gulch (R bank)
	0.7			Rattlesnake Gulch (R bank)
	2.5			Beartooth Creek (L bank)
2,233.2				American Bar Gulch (L bank)
2,233.7				Spring Gulch (R bank)
2,234.5				Foster Gulch (L bank)
2,235.5				Cochran Gulch (R bank)
2,235.9				Beaver Creek (R bank)
	0.9			Big Log Gulch (R bank)
		2.9		Stump Gulch (R bank)
		4.3		Left Fork Big Log Gulch (R bank)
	5.0			Hunters Gulch (R bank)
	5.2			Bridge Creek (L bank)
		0.8		Pole Creek (R bank)
		1.2		Cottonwood Gulch (L bank)
	6.9			Checkerboard Gulch (L bank)
	7.0			Bear Gulch Creek (R bank)
	8.3			Sheep Gulch (L bank)

- 2,235.9 Beaver Creek (R bank)
  - 9.4 Diamond Gulch (L bank)
  - 10.1 Moors Creek (R bank)
  - 11.0 Cottontail Gulch (L bank)
  - 11.7 Pike Creek (L bank)
  - 12.4 Gilman Gulch (R bank)
  - 12.5 Burnt Gulch (L bank)
  - 13.2 Porcupine Creek (R bank)
    - 0.4 Dry Gulch Creek (L bank)
  - 14.6 North Fork Beaver Creek (R bank)
    - 1.4 Wickiup Creek (R bank)
- 2,237.2 U.S.G.S. gaging station #6-0655
- 2,237.4 Hauser Dam and Power Plant
- 2,238.9 Favorite Gulch (R bank - into Hauser Lake)
- 2,239.1 Prickly Pear Creek (L bank - outlet of Lake Helena)
  - 3.9 Lake Helena Dam
  - 6.2 Silver Creek (L bank - into Lake Helena)
    - 10.2 Iowa Gulch (R bank)
    - 12.4 Three Mile Creek (R bank)
    - 12.7 Trust-to-luck Gulch (L bank)
    - 14.9 Sitzer Gulch (R bank)
    - 19.4 Sawmill Gulch (R bank)
      - 0.4 China Gulch (R bank)
      - 1.7 Eldorado Gulch (R bank)
    - 21.1 Jennies Fork (L bank)
    - 21.9 Rawhide Gulch (L bank)
    - 22.0 Ottawa Gulch (R bank)
      - 0.9 Woodchopper Gulch (R bank)
  - 7.1 Inlet Lake Helena
  - 9.4 Tenmile Creek (L bank)
    - 4.0 Last Chance Gulch (R bank)
      - 4.3 Grizzly Gulch (L bank)
        - 0.5 Squaw Gulch (R bank)
      - 4.4 Orofino Gulch (R bank)
        - 1.9 Arrasta Gulch (R bank)
    - 5.5 Sevenmile Creek (L bank)
      - 0.5 Cherry Creek (R bank)
        - 0.8 Independence Gulch (R bank)
      - 5.1 Granite Creek (R bank)
      - 5.8 Park Creek (L bank)
      - 5.9 U.S.G.S. gaging station #6-0635
      - 7.5 Spring Gulch (L bank)
      - 8.3 Skelly Gulch (L bank)
        - 0.1 St. Louis Gulch (L bank)
        - 2.0 Jeff Davis Gulch (L bank)
        - 2.1 Hamilton Gulch (R bank)
        - 4.4 East Skelly Gulch (L bank)
      - 9.7 Rattlesnake Gulch (R bank)
      - 10.3 Smith Gulch (R bank)
        - 0.8 Switzer Joe Gulch (R bank)
      - 12.5 Greenhorn Creek (L bank)
      - 12.6 Austin Creek (R bank)
        - 1.0 Granite Creek (R bank)

2,239.1				Prickly Pear Creek (L bank - outlet of Lake Helena)
	9.4			Tenmile Creek (L bank)
		8.1		U.S.G.S. gaging station #6-0630
		10.6		Blue Cloud Creek (L bank)
		11.9		Nelson Gulch (R bank)
		12.8		Colorado Gulch (R bank)
		14.0		Willow Creek (R bank)
		15.5		Sweeny Creek (L bank)
		17.3		Walker Creek (L bank)
			0.7	Spring Creek (L bank)
			1.3	Little Porcupine Creek (L bank)
		18.7		Bear Gulch (L bank)
		18.8		Lazyman Gulch (R bank)
		20.2		Moose Creek (R bank)
		20.4		U.S.G.S. gaging station #6-0625 (L bank)
		21.2		Deer Creek (L bank)
		21.7		Minnehaha Creek (L bank)
		23.1		Spring Creek (L bank)
		23.4		Beaver Creek (R bank)
			3.5	Chessman Reservoir Outlet
		25.2		Banner Creek (R bank)
		25.9		Ruby Creek (R bank)
		27.2		Monitor Creek (R bank)
	18.1			Highway #12 bridge at East Helena, Mt.
	18.3			U.S.G.S. gaging station #6-0620
2,240.4				Pipeline Crossing
2,242.0				Power Line Crossing
2,243.2				Soup Creek (R bank)
	2.4			Bull Run Gulch (L bank)
	2.7			Sweats Gulch (R bank)
	3.4			Cabin Gulch (R bank)
2,244.2				Highway #280 bridge near York, Mt.
2,244.3				Trout Creek (R bank)
	1.7			Trail Gulch (L bank)
	2.6			Prices Gulch (L bank)
	3.0			Dry Gulch (R bank)
	3.1			York Gulch (L bank)
		1.1		Kingsberry Gulch (L bank)
		3.3		Big Rattlesnake Gulch (L bank)
	4.6			Kelley Gulch (R bank)
	5.4			Beards Gulch (R bank)
	7.2			Blacksmith Gulch (R bank)
	8.8			Beartrap Gulch (R bank)
	8.9			Goodman Gulch (L bank)
	9.6			Swamp Gulch (L bank)
	9.8			Vigilante Gulch (L bank)
	11.6			Hanging Valley (L bank)
	12.4			Indian Creek (R bank)
		0.6		Hidden Valley (R bank)
		1.5		Bowman Gulch (L bank)
2,248.4				Centennial Gulch (R bank)
	0.6			Market Gulch (L bank)

2,248.7		Spokane Creek (L bank)
	4.1	Mitchell Gulch (L bank)
	8.5	Miller Creek (L bank)
	9.3	Sheep Creek (L bank)
2,249.2		Browns Gulch (R bank)
2,252.2		Oregon Gulch (R bank)
	0.2	Horse Gulch (L bank)
	0.9	Johnnys Gulch (R bank)
	1.1	Clarks Gulch (R bank)
2,252.5		Power Line Crossing
2,252.9		Canyon Ferry Dam and Reservoir (U.S.B.R.)
2,253.5		Cooper Gulch (R bank - into reservoir)
2,253.7		Cave Gulch (R bank - into reservoir)
2,253.9		Sheriff Gulch (L bank - into reservoir)
2,254.0		U.S.G.S. gaging station #6-0580 (under reservoir)
2,254.6		Magpie Creek (R bank - into reservoir)
	3.2	Washout Gulch (L bank)
	4.4	Coxcy Gulch (R bank)
	4.5	Fox Gulch (L bank)
	5.5	Collins Gulch (L bank)
	5.9	Bar Gulch (R bank)
	6.7	Never Sweat Gulch (R bank)
	7.2	Hunters Gulch (L bank)
	7.8	Grouse Creek (L bank)
	9.9	Sheriff Gulch (L bank)
	10.1	Culp Gulch (L bank)
2,256.6		Crittenden Gulch (L bank - into reservoir)
2,257.1		Hellgate Gulch (R bank - into reservoir)
	1.6	Little Hellgate Gulch (R bank)

****

XIII GLOSSARY

GLOSSARY

absorption loss (irrigation) - The initial loss of water from a canal or reservoir by wetting of the soil at the time water is first turned into the structure.

access road - A road or vehicular travelway constructed to provide needed access.

acre-foot - The volume of water that will cover one acre to a depth of one foot.

afforestation - The artificial establishment of forest crops by planting or sowing on land that has not previously or recently grown tree crops.

aftermath - The regrowth of forage crops after harvesting.

aggregation, soil - The cementing or binding together of several soil particles into a secondary unit, aggregate, or granule. Water-stable aggregates which will not disintegrate easily are of special importance to soil structure.

agribusiness - The sum of all operations involved in the production, storage, processing, and wholesale marketing of agricultural products.

agricultural land - Land in farms regularly used for agricultural production. The term includes all land devoted to crop or livestock enterprises; for example, the farmstead lands, drainage and irrigation ditches, water supply, cropland, and grazing land of every kind in farms.

alkali soil - 1: A soil with a high degree of alkalinity (pH of 8.5 or higher) or with a high exchangeable sodium content (15 percent or more of the exchange capacity), or both. 2: A soil that contains sufficient alkali (sodium) to interfere with the growth of most crop plants. (See saline-alkali soil.)

alluvial land - Areas of unconsolidated alluvium, generally stratified and varying widely in texture, recently deposited by streams, and subject to frequent flooding. A miscellaneous land type.

animal unit - A measure of livestock numbers based on the equivalent of a mature cow (approximately 1,000 pounds live weight). An animal unit is roughly one cow, one horse, one mule, five sheep, five swine, or six goats.

animal unit month - A measure of forage or feed requirement to maintain one animal unit for a period of 30 days. (Abb: A.U.M.)

aquifer - A geologic formation or structure that transmits water in sufficient quantity to supply the needs for a water development. The term water-bearing is sometimes used synonymously with aquifer when a stratum furnishes water for a specific use. Aquifers are usually saturated sands, gravel, fractures, cavernous and vesicular rock.

arable land - Areas of land so located that production of cultivated crops is economical and practical.

area, natural - 1. An area set aside indefinitely to preserve a representative unit of a major forest, range, or wetland type primarily for the purposes of science, research, or education. 2: A site or area in its natural state undisturbed by man's activities.

arid - A term applied to regions or climates that lack sufficient moisture for crop production without irrigation. The limits of precipitation vary considerably according to temperature conditions, with an upper annual limit for cool regions of 10 inches or less and for tropical regions as much as 15 to 20 inches. Contrast with semiarid.

available forage - Forage that is accessible for animal consumption.

available water - The portion of water in a soil that can be absorbed by plant roots, usually considered to be that water held in the soil against a tension of up to approximately 15 bars. (See field capacity.)

available water-holding capacity (soils) - The capacity to store water available for use by plants, usually expressed in linear depths of water per unit depth of soil. Commonly defined as the difference between the percentage of soil water at field capacity and the percentage of wilting point. This difference multiplied by the bulk density and divided by 100 gives a value in surface inches of water per inch depth of soil. (See field capacity.)

base flow - The stream discharge from groundwater runoff.

bedload - The sediment that moves by sliding, rolling, or bounding on or very near the streambed; sediment moved mainly by tractive or gravitational forces or both but at velocities less than the surrounding flow.

bedrock - The more or less solid rock in place either on or beneath the surface of the earth. It may be soft or hard and have a smooth or irregular surface.

bentonite - A highly plastic clay consisting of the minerals montmorillonite and beidellite that swells extensively when wet.

blind drain - A type of drain consisting of an excavated trench refilled with previous materials, such as coarse sand, gravel or crushed stones, through whose voids water percolates and flows towards an outlet. Often referred to as a French drain because of its initial development and widespread use in France.

board foot - A unit of measure of the wood in lumber, logs, bolts, or trees; it is the amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before surfacing or other finishing. (Abb: bd. ft.)

border dikes - Earth ridges built to guide or hold irrigation water within prescribed limits in a field; a small levee.

border irrigation - A surface method of irrigation by flooding between border dikes.

broadcast seeding - Scattering seed on the surface of the soil. Contrast with drill seeding which places the seed in rows in the soil.

brush control - Suppressing of brush to reduce its competition with more desirable species.

buffer strips - Strips of grass or other erosion-resisting vegetation between or below cultivated strips or fields.

bunchgrass - A grass that does not have rhizomes or stolons and forms a bunch or tuft.

calcareous soil - Soil containing sufficient calcium carbonate (often with magnesium carbonate) to effervesce visibly when treated with cold 0.1 normal hydrochloric acid.

calf crop - The number of calves produced by a given number of cows, usually expressed in percent of calves weaned of cows bred.

camping site - An area of land used for tent, trailer, or other camping vehicle or pack camping, including transient camping.

canal (irrigation) - Constructed open channel for transporting water from the source of supply to the point of distribution.

carrying capacity (recreation) - The amount of use a recreation area can sustain without deterioration in its quality. (wildlife) - The maximum number of animals an area can support during a given period of the year. (See grazing capacity.)

cattle walkway - An earth fill or embankment constructed on marsh range or range areas subject to overflow.

centrifugal pump - A device that converts mechanical energy to pressure or kinetic energy in a fluid by imparting centrifugal force on the fluid through a rapidly rotating impeller.

channel - A natural stream that conveys water; a ditch or channel excavated for the flow of water.

channel stabilization - Erosion prevention and stabilization of velocity distribution in a channel using jetties, drops, revetments, vegetation, and other measures.

check (hydraulics, irrigation) - A structure, permanent or portable, designed to raise or control the water surface in a channel or ditch.

chiseling - Breaking or loosening the soil, without inversion, with a chisel cultivator or chisel plow.

clay (soils) - 1: A mineral soil separate consisting of particles less than 0.002 millimeters is equivalent diameter. 2: A soil textural class. 3: (engineering) A fine-grained soil that has a high plasticity index in relation to the liquid limits.

claypan - A dense, compact layer in the subsoil having a much higher clay content than the overlying material from which it is separated by a sharply defined boundary; formed by downward movement of clay or by synthesis of clay in place during soil formation. Claypans are usually hard when dry and plastic and sticky when wet. They usually impede the movement of water and air. With adequate fertility they often do not impede plant roots. (See hardpan.)

clearcutting (forestry) - A method of cutting that removes the entire timber stand on the area cut. Contrast with selective cutting.

climax vegetation - Relatively stable vegetation in equilibrium with its environment and with good reproduction of the dominant plants.

closed drain - Subsurface drain, tile, or perforated pipe that receives surface water through surface inlets.

comprehensive plan - A plan for the development of an area including policies, goals, and interrelated plans for private and public land use, transportation systems, community facilities, and all other elements and features that in composite represent the decisions of local people.

conifer - A tree belonging to the order Coniferae, usually evergreen, with cones and needle-shaped or scale-like leaves and producing wood known commercially as "soft wood."

conservation - The protection, improvement, and use of natural resources according to principles that will assure their highest economic or social benefits.

conservation district - A public organization created under state law as a special-purpose district to develop and carry out a program of soil, water, and related resource conservation, use, and development within its boundaries; usually a subdivision of state government with a local governing body and always with limited authorities. Often called a soil conservation district or a soil and water conservation district.

conservation plan for farm, ranch, or nonagricultural land unit - The properly recorded decisions of the cooperating landowner or operator on how he plans, within practical limits, to use his land in an operating unit within its capability and to treat it according to its needs for maintenance or improvement of the soil, water, and plant resources.

contour - 1: An imaginary line on the surface of the earth connecting points of the same elevation. 2: A line drawn on a map connecting points of the same elevation.

contour farming - Conducting field operations, such as plowing, planting, cultivating and harvesting on the contour.

contour stripcropping - Layout of crops in comparatively narrow strips in which the farming operations are performed approximately on the contour. Usually strips of grass, close-growing crops, or fallow are alternated with those in cultivated crops.

controlled burning - The deliberate use of fire where the burning is restricted to a predetermined area and intensity. (Syn: prescribed burning.)

cool-season plant - A plant that makes its major growth during the cool portion of the year, primarily in the spring but in some localities in the winter.

cover (wildlife) - Plants or objects used by wild animals for nesting, rearing of young, resting, escape from predators, or protection from adverse environmental conditions.

cover crop - A close-growing crop grown primarily for the purpose of protecting and improving soil between periods of regular crop production or between trees and vines in orchards and vineyards.

cropland - Land used primarily for the production of adapted cultivated, close-growing, fruit, or nut crops for harvest, alone or in association with sod crops.

crop residue - The portion of a plant or crop left in the field after harvest.

crop residue management - Use of that portion of the plant or crop left in the field after harvest for protection or improvement of the soil.

crop rotation - The growing of different crops in recurring succession on the same land.

cubic foot per second - Rate of fluid flow at which 1 cubic foot of fluid passes a measuring point in 1 second. (Abb: cfs; Syn: Second-foot; CUSEC.)

cut-and-fill - Process of earth moving by excavating part of an area and using the excavated material for adjacent embankments or fill areas.

dam - A barrier to confine or raise water for storage or diversion, to create a hydraulic head, to prevent gully erosion, or for retention of soil, rock, or other debris.

debris - A term applied to the loose material arising from the disintegration of rocks and vegetative material; transportable by streams, ice, or floods.

debris dam - A barrier built across a stream channel to retain rock, sand, gravel, silt, or other material.

decreaser plant species - Plant species in the original vegetation that will decrease in relative amount with continued overuse; often termed decreasers.

deferred grazing - Discontinuance of grazing livestock on an area for a specified period of time during the growing season to promote plant reproduction, establishment of new plants, or restoration of vigor by old plants.

deferred-rotation grazing - A systematic rotation of deferred grazing.

deposition - The accumulation of material dropped because of a slackening movement of the transporting agents water or wind.

depth, effective soil - The depth of soil material that plant roots can penetrate readily to obtain water and plant nutrients. It is the depth to a layer that differs sufficiently from the overlying material in physical or chemical properties to prevent or seriously retard the growth of roots.

desilting area - An area of grass, shrubs, or other vegetation used for inducing deposition of silt and other debris from flowing water, located above a stock tank, pond, field, or other area needing protection from sediment accumulation. (See filter strip.)

detention dam - A dam constructed for the purpose of temporary storage of streamflow or surface runoff and for releasing the stored water at controlled rates.

dike (engineering) - An embankment to confine or control water, especially one built along the banks of a river to prevent overflow of lowlands; a levee. (geology) A tabular body of igneous rock that cuts across the structure of adjacent rocks or cuts massive rocks.

discharge (hydraulics) - Rate of flow, specifically fluid flow; a volume of fluid passing a point per unit time, commonly expressed as cubic feet per second, million gallons per day, gallons per minute, or cubic meters per second.

distribution system (irrigation) - 1: System of ditches and their appurtenances which convey irrigation water from the main canal to the farm units. 2: Any system that distributes water within a farm.

diversion - Channel constructed across the slope for the purpose of intercepting surface runoff; changing the accustomed course of all or part of a stream.

diversion dam - A barrier built to divert part or all of the water from a stream into a different course.

diversion terrace - Diversions which differ from terraces in that they consist of individually designed channels across a hillside; may be used to protect bottomland from hillside runoff or may be needed above a terrace system for protection against runoff from an unterraced area. It may also divert water out of active gullies, protect farm buildings from runoff, reduce the number of waterways, and is sometimes used in connection with stripcropping to shorten the length of slope so that the strips can effectively control erosion.

drain - 1: A buried pipe or other conduit (closed drain). 2: A ditch (open drain) for carrying off surplus surface water or groundwater.

drill seeding - Planting seed with a drill in relatively narrow rows, generally less than a foot apart. Contrast with broadcast seeding.

drop-inlet spillway - Overfall structure in which the water drops through a vertical riser connected to a discharge conduit.

drop spillway - Overfall structure in which the water drops over a vertical wall onto an apron at a lower elevation.

drop structure - A structure for dropping water to a lower level and dissipating its surplus energy; a fall. A drop may be vertical or inclined. (Syn: drop.)

dryland farming - The practice of crop production in low rainfall areas without irrigation.

duckfoot - An implement with horizontally spreading, V-shaped tillage blades or sweeps which are normally adjusted to provide shallow cultivation without turning over the surface soil or burying surface crop residue.

dugout pond - An excavated pond as contrasted with a pond formed by constructing a dam.

earth dam - Dam constructed of compacted soil materials.

ecology - The study of the interrelationships of organisms to one another and to the environment.

ecosystem - Energy-driven complex of a community of organisms and its controlling environment.

effective precipitation - That portion of total precipitation that becomes available for plant growth. It does not include precipitation lost to deep percolation below the root zone or to surface runoff.

emergency spillway - A spillway used to carry runoff exceeding a given design flood.

environment - The sum total of all the external conditions that may act upon an organism or community to influence its development or existence.

erosion - 1: The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep. 2: Detachment and movement of soil or rock fragments by water, wind, ice, or gravity. The following terms are used to describe different types of water erosion:

accelerated erosion - Erosion much more rapid than normal, natural, or geologic erosion, primarily as a result of the influence of the activities of man or, in some cases, of other animals or natural catastrophies that expose base surfaces, for example, fires.

geological erosion - The normal or natural erosion caused by geological processes acting over long geologic periods and resulting in the wearing away of mountains, the building up of floodplains, coastal plains, etc. (Syn: natural erosion.)

gully erosion - The erosion process whereby water accumulates in narrow channels and over short periods removes the soil from this narrow area to considerable depths, ranging from 1 to 2 feet to as much as 75 to 100 feet.

natural erosion - Wearing away of the earth's surface by water, ice, or other natural agents under natural environmental conditions of climate, vegetation, etc., undisturbed by man. (Syn: geological erosion.)

normal erosion - The gradual erosion of land used by man which does not greatly exceed natural erosion. (See natural erosion.)

rill erosion - An erosion process in which numerous small channels only several inches deep are formed; occurs mainly on recently cultivated soils.

sheet erosion - the removal of a fairly uniform layer of soil from the land surface by runoff water.

splash erosion - The spattering of small soil particles caused by the impact of raindrops on wet soils. The loosened and spattered particles may or may not be subsequently removed by surface runoff.

erosive - Refers to wind or water having sufficient velocity to cause erosion. Not to be confused with erodible as a quality of soil.

eutrophication - A means of aging of lakes whereby aquatic plants are abundant and waters are deficient in oxygen. The process is usually accelerated by enrichment of waters with surface runoff containing nitrogen and phosphorus.

evapotranspiration - Water transpired by vegetation plus that evaporated from the soil. (Syn: consumptive use.)

exclusion of livestock - Excluding all livestock from a designated area for the purpose of protecting or establishing forage or woody plants and for controlling erosion.

fallow - Allowing cropland to lie idle, either tilled or untilled, during the whole or greater portion of the growing season.

family farm - A farm business in which the operating family does most of the work, most of the managing, and takes the risks.

farm - Places of less than 10 acres where gross sales of agricultural products equal or exceed $250 annually and places of 10 acres or more where gross sales of agricultural products equal or exceed $50 per year (Bureau of Census).

fauna - The animal life of a region.

fertility, soil - The quality of a soil that enables it to provide nutrients in adequate amounts and in proper balance for the growth of specified plants when other growth factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

fertilizer - Any organic or inorganic material of natural or synthetic origin that is added to a soil to supply elements essential to plant growth.

fertlizer analysis - The percentage composition expressed in terms of nitrogen, phosphoric acid, and potash. For example, a fertilizer with a 6-12-6 analysis contains 6 percent nitrogen (N), 12 percent available phosphoric acid (P_2O_5), and 6 percent water-soluble potash (K_2O). Minor elements may also be included. Recent analysis expresses the percentages in terms of the elemental fertilizer (nitrogen, phosphorus, potassium).

field capacity (field moisture capacity) - The amount of soil water remaining in a soil after the free water has been allowed to drain away for a day or two if the root zone has been previously saturated. It is the greatest amount of water that the soil will hold under conditions of free drainage, usually expressed as a percentage of the oven-dry weight of soil or other convenient unit.

field stripcropping - A system of stripcropping in which crops are grown in parallel strips laid out across the general slope but which do not follow the contour. Strips of grass or close-growing crops are alternated with strips of cultivated crops.

filter strip - Strip of permanent vegetation above farm ponds, diversion terraces, and other structures to retard flow of runoff water, causing deposition of transported material, thereby reducing sediment flow. (See desilting area.)

flood - An overflow or inundation that comes from a river or other body of water and causes or threatens damage.

flood irrigation - The application of irrigation water where the entire surface of the soil is covered by a sheet of water, called "controlled flooding" when water is impounded or the flow directed by border dikes, ridges, or ditches.

floodplain - Nearly level land situated on either side of a channel which is subject to overflow flooding.

floodwater retarding structure - A structure providing for temporary storage of floodwater and for its controlled release.

floodway - A channel, either natural, excavated, or bounded by dikes and levees, used to carry excessive flood flows to reduce flooding. Sometimes considered to be the transitional area between the active channel and the floodplain.

flora - The sum total of the kinds of plants in an area at one time.

flume - An open conduit on a prepared grade, trestle, or bridge for the purpose of carrying water across creeks, gullies, ravines, or other obstructions. It may also apply to an entire canal where it is elevated above natural ground for its entire length. Sometimes used in reference to calibrated devices used to measure the flow of water in open conduits.

forage - All browse and herbaceous food that is available to livestock or game animals, used for grazing or harvested for feeding.

gated pipe - Portable pipe with small gates installed along one side for distributing water to corrugations or furrows.

governing body, conservation district - The appointed or elected supervisors (directors or commissioners) of a (soil or soil and water) conservation district established according to state law. Name of district, number and method of naming members of governing body, and tenure varies with state laws; usual number is five.

gradation (geology) - The bringing of a surface or a stream bed to grade by running water. As used in connection with sedimentation and fragmental products for engineering evaluation, the term gradation refers to the frequency distribution of the various sized grains that constitute a sediment, soil, or other material.

grade - 1: The slope of a road, channel, or natural ground. 2: The finished surface of a canal bed, roadbed, top of embankment, or bottom of excavation; any surface prepared for the support of construction like paving or laying a conduit. 3: To finish the surface of a canal bed, roadbed, top of embankment, or bottom of excavation.

grade stabilization structure - A structure for the purpose of stabilizing the grade of a gully or other watercourse, thereby preventing further head-cutting or lowering of the channel grade.

grassed waterway - A natural or constructed waterway, usually broad and shallow, covered with erosion-resistant grasses, used to conduct surface water from cropland.

gravity irrigation - Irrigation in which the water is not pumped but flows and is distributed by gravity; includes sprinkler systems when gravity furnishes the desired head.

grazeable woodland - Forest land on which the understory includes as an integral part of the forest plant community plants that can be grazed without significantly impairing other forest values.

grazing capacity - The maximum stocking rate possible without inducing damage to vegetation or related resources.

grazing distribution - Dispersion of livestock grazing within a management unit or area.

grazing season - The portion of the year that livestock grazes or is permitted to graze on a given range or pasture. Sometimes called grazing period.

grazing system - The manipulation of grazing animals to accomplish a desired result.

green manure crop - Any crop grown for the purpose of being turned under while green or soon after maturity for soil improvement.

gully - A channel or miniature valley cut by concentrated runoff but through which water commonly flows only during and immediately after heavy rains or during the melting of snow. A gully may be dendritic or branching or it may be linear, rather long, narrow, and of uniform width. The distinction between gully and rill is one of depth. A gully is sufficiently deep that it would not be obliterated by normal tillage operations, whereas a rill is of lesser depth and would be smoothed by ordinary farm tillage. (Syn: arroyo. See erosion, rill.)

gully control plantings - The planting of forage, legume, or woody plant seeds, seedlings, cuttings, or transplants in gullies to establish or reestablish a vegetative cover adequate to control runoff and erosion and incidentally produce useful products.

hardpan - A hardened soil layer in the lower A or in the B horizon caused by cementation of soil particles with organic matter or with materials such as silica, sesquioxices, or calcium carbonate. The hardness does not change appreciably with changes in moisture content and pieces of the hard layer do not slake in water.

highway erosion control - The prevention and control of erosion in ditches, at cross drains, and on fills and road banks within a highway right-of-way. Includes vegetative practices and structural practices.

impoundment - Generally an artificial collection or storage of water, as a reservoir, pit, dugout, sump, etc.

increaser plant species - Plant species of the original vegetation that increase in relative amount, at least for a time, under overuse. Commonly termed increasers.

indicator - An organism, species, or community that shows the presence of certain environmental conditions.

infiltration - The flow of a liquid into a substance through pores or other openings, connoting flow into a soil in contradistinction to the word percolation which connotes flow through a porous substance.

invader plant species - Plant species that were absent in undisturbed portions of the original vegetation and will invade under disturbance or continued overuse. Commonly termed invaders.

irrigable lands - Lands having soil, topographic, drainage, and climatic conditions favorable for irrigation and located in a position where a water supply is or can be made available.

irrigation district - A cooperative, self-governing public corporation set up as a subdivision of the state, with definite geographic boundaries, organized to obtain and distribute water for irrigation of lands within the district. It is created under authority of the state legislature with the consent of a designated fraction of the landowners or citizens and has taxing power.

irrigation water management - The use and management of irrigation water where the quantity of water used for each irrigation is determined by the water-holding capacity of the soil and the need for the crop, and where the water is applied at a rate and in such a manner that the crop can use it efficiently and significant erosion does not occur.

irrigation water requirement - Quantity of water, exclusive of effective precipitation, that is required for crop production.

key grazing area - That portion of a pasture or grazing unit which, because of its nature, location, and grazing use, serves to control the pattern of grazing use for the pasture as a whole.

land - The total natural and cultural environment within which production takes place, a broader term than soil. In addition to soil, its attributes include other physical conditions, such as mineral deposits, climate, and water supply; location in relation to centers of commerce, populations and other land; the size of the individual tracts or holdings, and existing plant cover, works of improvement, and the like. Some use the term loosely in other senses: as defined above but without the economic or cultural criteria; especially in the expression "natural land"; as a synonym for "soil"; for the solid surface of the earth, and also for earthy surface formation, especially in the geomorphological expression "land form".

land capability - The suitability of land for use without permanent damage. Land capability, as ordinarily used in the United States, is an expression of the effect of physical land conditions, including climate, on the total suitability for use without damage for crops that require regular tillage, for grazing, for woodland, and for wildlife. Land capability involves consideration of (1) the risks of land damage from erosion and other causes and (2) the difficulties in land use owing to physical land characteristics, including climate.

land capability classification - A grouping of kinds of soil into special units, subclasses, and classes according to their capability for intensive use and the treatments required for sustained use; prepared by the Soil Conservation Service, USDA.

land leveling - Process of shaping the land surface for better movement of water and machinery over the land. Also called land forming, land shaping, or land grading.

land use planning - The process by which decisions are made on future land uses over extended time periods that are deemed to best serve the general welfare. Decision-making authorities on land uses are usually vested in state and local governmental units, but citizen participation in the planning process is essential for proper understanding and implementation, usually through zoning ordinances.

leached saline soils - 1: Soils from which the soluble salts have been removed by leaching. 2: Soils that have been saline and still possess the major physical characteristics of saline soils but from which the soluble salts have been leached, generally for reclamation.

length of run - Distance water must run in furrows or between borders over the surface of a field from one head ditch to another, or to the end of the field.

light soil - A coarse-textured soil with a low drawbar pull and, hence, easy to cultivate. (See **soil texture.**)

manure - The excreta of animals, with or without the admixture of bedding or litter, in varying stages of decomposition.

measuring weir - A shaped notch through which water flows are measured. Common shapes are rectangular, trapezoidal, and triangular.

mineral soil - A soil consisting predominantly of and having its properties determined predominantly by mineral matter, usually containing less than 20 percent organic matter but sometimes containing an organic surface layer up to 30 centimeters thick.

miner's inch - The rate of discharge through an orifice 1 inch square under a specified head. An old term used in the western United States, now seldom used except where irrigation or mining water rights are so specified. The equivalent flow in cubic feet per second is fixed by state statute. One miner's inch is equivalent to 0.025 cubic foot per second in Arizona, California, Montana, and Oregon; 0.020 cubic foot per second in Idaho, Kansas, Nebraska, New

Mexico, North and South Dakota, and Utah; 0.026 cubic foot per second in Colorado; and 0.028 cubic foot per second in British Columbia. (See cubic foot per second.)

minimum tillage - That amount of tillage required to create the proper soil condition for seed germination, plant establishment, and prevention of competitive growth.

Moh's scale of hardness - Relative hardness of minerals ranging from a rating of 1 for the softest (talc) to 10 for the hardest (diamond). Calcite has a hardness of 3 and can be scratched with a copper coin.

moraine - An accumulation of drift, with an initial topographic expression of its own, built within a glaciated region chiefly by the direct action of glacial ice. Examples are ground, lateral, recessional, and terminal moraines.

mottled (soils) - Soil horizons irregularly marked with spots of color. A common cause of mottling is impeded drainage, although there are other causes, such as soil development from an unevenly weathered rock. The weathering of different kinds of minerals may cause mottling.

mulch - A natural or artificial layer of plant residue or other materials, such as sand or paper, on the soil surface.

native species - A species that is a part of an area's original fauna or flora.

nonrenewable natural resources- Natural resources that once used cannot be replaced.

odd area (wildlife) - A small area of land, such as a bare knob, fence corner, sink hole, blow-out, borrow pit, or an irregularly shaped area, that may be best used to produce wildlife habitat.

outdoor recreation - The use of soil, water, and natural resources and their aesthetic values and productivity in accordance with the suitability of these resources for providing outdoor leisure-time activities to serve the needs of the people.

overgrazing - Grazing so heavy that it impairs future forage production and causes deterioration through damage to plants or soil or both.

overuse - Excessive use of the current year's growth which will result in range deterioration or over-grazing if continued. (Syn: overutilization.)

palatibility - Plant characteristics or conditions that stimulate a selective response by animals.

parent material (soils) - The unconsolidated, chemically weathered mineral or organic matter from which the solum of soils has developed by pedogenic processes. The C horizon may or may not consist of materials similar to those from which the A and B horizons developed.

pasture improvement - Any practice of grazing, mowing, fertilizing, liming, seeding, scattering droppings, contour furrowing, or other methods of management designed to improve vegetation for grazing purposes.

pastureland - Land used primarily for the production of adapted domesticated forage plants to be grazed by livestock.

pasture management - The application of practices to keep pasture plants growing actively over as long a period as possible so that they will provide palatable feed of high nutritive value; to encourage the growth of desirable grasses and legumes while crowding out weeds, brush, and inferior grasses. (See pasture improvement.)

permeability, soil - The quality of a soil horizon that enables water or air to move through it. The permeability of a soil may be limited by the presence of one nearly impermeable horizon even though the others are permeable.

pH soil - A numerical measure of the acidity or hydrogen ion activity of a soil. The neutral point is pH 7.0. All pH values below 7.0 are acid and all above 7.0 are alkaline.

pitting - 1: Making shallow pits of suitable capacity and distribution to retain water from rainfall or snowmelt on rangeland or pasture. 2: Small cavities in a surface created by corrosion, cavitation, or subatmospheric pressures.

plant material center - A place where plants are assembled and their value and use in a conservation program is determined. This includes both domestic collections and plant introductions. Plants are assembled, their performance is evaluated, selections are made and increased for field testing, varieties are named and released, and foundation-quality seed and/or stock is produced and distributed to cooperative seed growers and nurseries for commercial production and use.

pollution, water - Any change in the character of water adversely affecting its usefulness.

proper grazing use - Grazing ranges and pastures in a manner that will maintain adequate cover for soil protection and maintain or improve the quality and quantity of desirable vegetation.

proper stocking - Stocking the grazing unit to obtain proper grazing use.

puddled soil - A dense soil dominated by massive or single-grain structure, almost impervious to air and water. This condition results from handling a soil when it is in a wet, plastic condition so that when it dries it becomes hard and cloddy.

pure live seed - The product of the percentage of germination plus the hard seed and the percentage of pure seed, divided by 100.

range - 1: All land producing native forage for animal consumption and land that is revegetated naturally or artifically to provide a forage cover that is managed like native vegetation. Generally considered as land that is not cultivated. 2: (wildlife) The geographic area occupied by an organism.

range condition - The state and health of the range based on what it is naturally capable of producing.

range condition class - One of a series of arbitrary categories used to classify range condition, usually expressed as either excellent, good, fair, or poor.

range condition trend - The direction of change in range condition.

range management - The art and science of planning and directing range use to obtain sustained maximum animal production consistent with perpetuation of the natural resources.

range seeding - Establishing adapted plant species on ranges by means other than natural revegetation.

range site - A distinctive kind of rangeland that differs from other kinds of rangeland in its potential to produce native plants.

recreation area - An area used for outdoor recreation.

recreation area planting - Establishing grasses, legumes, vines, shrubs, trees, or other plants on recreation areas.

recreation area stabilization - Stabilizing recreation areas subject to heavy use by surfacing with suitable materials or by installing needed structures.

recreation development - A created or improved outdoor area for the enjoyment of outdoor recreation.

recreation enterprise - A private outdoor recreation business operated for profit.

recreation land - Land and water used or usable primarily as sites for outdoor recreation facilities and activities.

recreation land grading and shaping - Altering the surface of land to meet the requirements of recreation facilities.

recreation resource - Land and water areas and their natural attributes, with or without man-made facilities, that provide opportunities for outdoor recreation.

recreation trail and walkway - A pathway prepared especially for pedestrian, equestrian, and cycle travel.

reservoir - Impounded body of water or controlled lake in which water is collected or stored.

residual soil - A soil formed in material weathered from bedrock without transportation from the original location.

rest-rotation grazing - A form of deferred-rotation grazing in which at least one grazing unit is rested from grazing for a full year.

return flow - That portion of the water diverted from a stream which finds its way back to the stream channel either as surface or underground flow.

riprap - Broken rock, cobbles, or boulders placed on earth surfaces, such as the face of a dam or the bank of a stream, for protection against the action of water (waves); also applied to brush or pole mattresses, or brush and stone, or other similar material used for soil erosion control.

river basin - The United States has been divided into 20 major water resource regions (river basins).

rotation grazing - Grazing two or more pastures or parts of a range in regular order with definite recovery periods between grazing periods. Where only two fields are involved, sometimes called alternate grazing. Contrast with continuous grazing.

rotation pasture - A cultivated area used as a pasture one or more years as a part of crop rotation. Contrast with permanent pasture.

saline-alkali soil - 1: A soil containing sufficient exchangeable sodium to interfere with the growth of most crop plants and containing appreciable quantities of soluble salts. The exchangeable-sodium percentage is greater than 15, the conductivity of the saturation extract greater than 4 millimhos per centimeter (25 degrees centigrade), and the pH is usually 8.5 or less in the saturated soil. 2: A saline-alkali soil has a combination of harmful quantities of salts and either a high alkalinity or high content of exchangeable sodium or both, so distributed in the profile that the growth of most crop plants is reduced. Often called saline-sodic soil.

saline soil - A nonalkali soil containing sufficient soluble salts to impair its productivity but not containing excessive exchangeable sodium. This name was formerly applied to any soil containing sufficient soluble salts to interfere with plant growth commonly greater than 3,000 parts per million.

salting - 1: Providing salt as a mineral supplement for animals. 2: Placing salt on the range in such a manner as to improve distribution of livestock.

savanna (savannah) - A grassland with scattered trees, either as individuals or clumps. Often a transitional type between true grassland and forest.

sediment - Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

sediment discharge - The quantity of sediment, measured in dry weight or by volume, transported through a stream cross-section in a given time. Sediment discharge consists of both suspended and load and bedload.

seedbed - The soil prepared by natural or artificial means to promote the germination of seed and the growth of seedlings.

seed inoculation - The process of adding microorganisms to seed, used frequently to designate the treatment of leguminous seed with symbiotic nitrogen-fixing bacteria (rhizobia).

seed purity - The percentage of the desired species in relation to the total quantity, including other species, weed seed, and foreign matter.

selective cutting (forestry) - A system of cutting in which single trees, usually the largest, or small groups of such trees are removed to encourage reproduction under the remaining stand and in the openings. Contrast with clear cutting.

shelterbelt - A wind barrier of living trees and shrubs established and maintained for protection of farm fields. (Syn: windbreak.)

shrub - A woody perennial plant differing from a perennial herb by its more woody stems and from a tree by its low stature and habit of branching from the base. There is no definite line between herbs and shrubs or between shrubs and trees; all possible intergradations occur.

side slopes (engineering) - The slope of the sides of a canal, dam, or embankment. It is customary to name the horizontal distance first, as 1.5 to 1, or frequently, 1 1/2:1, meaning a horizontal distance of 1.5 feet to 1 foot vertical.

silage - A crop that has been preserved in a moist succulent condition by partial fermentation. Chief silage crops are corn, sorghums, and various legumes and grasses.

silt loam - Soil material that contains 50 percent or more silt and 12 to 27 percent clay, or 50 to 80 percent silt and less than 12 percent clay.

silt - Soil material that contains 80 percent or more silt and less than 12 percent clay.

siphon (hydraulics) - A closed conduit, a part of which rises above the hydraulic grade line, utilizing atmospheric pressure to cause the flow of water.

site (ecology) - 1: An area considered for its ecological factors with reference to capacity to produce vegetation; the combination of biotic, climatic, and soil conditions of an area. 2: An area sufficiently uniform in soil, climate, and natural biotic conditions to produce a particular climax vegetation.

snow course - A course laid out and permanently marked on the drainage area of a stream along which the snow is sampled at appropriate times to determine its depth and density for the purpose of forecasting subsequent runoff.

snow density - The water content of snow expressed as a percentage by volume. In snow surveys, the ratio of the scale reading (inches of water) to the length of the snow core in inches.

snow surveys - A set of measurements of the depth and density of snow, usually made to determine the water stored on a drainage basin in the form of snow as an aid to predicting the subsequent runoff.

sod grasses - Stoloniferous or rhizomatous grasses that form a sod or turf.

soil - 1: The unconsolidated mineral and organic material on the immediate surface of the earth that serves as a natural medium for the growth of land plants. 2: The unconsolidated mineral matter on the surface of the earth that has been subjected to and influenced by genetic and environmental factors of parent material, climate (including moisture and temperature effects), macro- and micro-organisms, and topography, all acting over a period of time and producing a product (soil) that differs from the material from which it is derived in many physical, chemical, biological, and morphological properties and characteristics. 3: A kind of soil is the collection of soils that are alike in specified combinations of characteristics. Kinds of soil are given names in the system of soil classification. The terms "the soil" and "soil" are collective terms used for all soils, equivalent to the word "vegetation" for all plants.

soil erosion - The detachment and movement of soil from the land surface by wind or water. (See gully erosion; rill erosion, sheet erosion; splash erosion.)

soil improvement - The processes for or the results of making the soil more productive for growing plants by drainage, irrigation, addition of fertilizers and soil amendments, and the like.

soil map - A map showing the distribution of soil types or other soil mapping units in relation to the prominent physical and cultural features of the earth's surface. The following kinds of soil maps are recognized in the United States: detailed, detailed reconnaissance, reconnaissance, generalized, and schematic.

soil productivity - The capacity of a soil in its normal environment for producing a specified plant or sequence of plants under a specified system of management.

soil structure - The combination or arrangement of primary soil particles, units, or peds. The secondary units are characterized and classified on the basis of size, shape, and degree of distinctness into classes, types, and grades respectively.

soil survey - A general term for the systematic examination of soils in the field and in laboratories; their description and classification; the mapping of kinds of soil; the interpretation of soils according to their adaptability for various crops, grasses, and trees; their behavior under use or treatment for plant production or for other purposes; and their productivity under different management systems.

soil texture - The relative proportions of the various soil separates in a soil as described by the classes of soil texture. The textural classes may be modified by the addition of suitable adjectives when coarse fragments are present in substantial amounts; for example, gravelly silt loam. Sandy, loamy sand, and sandy loam are further subdivided on the basis of the proportions of the various sand separates present.

soil type - 1: A subdivision of a soil series based on surface texture. At the present time in the United States a soil type is considered as a kind of phase and is not part of the soil classification system presently being used. 2: In Europe, a class roughly equivalent to a great soil group.

spillway - An open or closed channel, or both, used to convey excess water from a reservoir. It may contain gates, either manually or automatically controlled, to regulate the discharge of excess water.

spoilbank - A pile of soil, subsoil, rock, or other material excavated from a drainage ditch, pond, or other cut.

sprinkler irrigation - Irrigation where water is applied by means of perforated pipes or nozzles operated under pressure so as to form a spray pattern.

sprinkler systems - All sprinkler lines, main lines, submains, pumping plant, operation control equipment, and other accessories required for applying water to a field by the sprinkler method.

stabilized grade - The slope of a channel at which neither erosion nor deposition occurs.

stocking rate - The actual number of animals using a grazing unit; for example, cows per acre, horses per acre, etc.

stockwater development - Development of new or improved sources of stockwater supplies, such as wells, springs, and ponds, together with storage and delivery systems.

streambanks - The usual boundaries, not the flood boundaries, of a stream channel. Right and left banks are named facing downstream.

stripcropping - Growing crops in a systematic arrangement of strips or bands which serve as barriers to wind and water erosion. (See buffer strips; contour stripcropping; field stripcropping; filter strip; contour; wind stripcropping.)

stubble - The basal portion of plants remaining after the top portion has been harvested; also, the portion of the plants, principally grasses, remaining after grazing is completed.

stubble mulch - The stubble of crops or crop residue left essentially in place on the land as a surface cover during fallow and the growing of a succeeding crop.

subirrigation - Applying irrigation water below the ground surface either by raising the water table within or near the root zone, or by using a buried perforated or porous pipe system that discharges directly into the root zone.

subsoiling - The tillage of subsurface soil, without inversion, for the purpose of breaking up dense layers that restrict water movement and root penetration.

succession - The progressive development of vegetation toward its highest ecological expression, the climax; replacement of one plant community by another.

summer fallow - The tillage of uncropped land during the summer in order to control weeds and store moisture in the soil for the growth of a later crop.

supplemental irrigation - Irrigation to insure or increase crop production in areas where rainfall normally supplies most of the moisture needed.

tailwater (hydraulics) - Water in a river or channel immediately downstream from a structure. (irrigation) - Water that reaches the lower end of a field.

tight soil - A compact, relatively impervious and tenacious soil or subsoil which may or may not be plastic.

tile, drain - Pipe made of burned clay, concrete, or similar material in short lengths, usually laid with open joints to collect and carry excess water from the soil.

tile drainage - Land drainage by means of series of tile lines laid at a specified depth and grade.

tillage - The operation of implements through the soil to prepare seedbeds and root beds.

tilth - The physical condition of soil as related to its ease of tillage, fitness as a seedbed, and impedance to seedling emergence and root penetration.

topsoil - 1: Earthy material used as top-dressing for house lots, grounds for large buildings, gardens, road cuts, or similar areas. It has favorable characteristics for production of desired kinds of vegetation or can be made favorable. 2: The surface plow layer of a soil. (Syn: surface soil.) 3: The original or present dark-colored upper soil that ranges from a mere fraction of an inch to two or three feet thick on different kinds of soil. 4: The original or present A horizon, varying widely among different kinds of soil. Applied to soils in the field, the term has no precise meaning unless defined as to depth or productivity in relation to a specific kind of soil.

toxic salt reduction - Decreasing harmful concentrations of toxic salts in soils, usually by leaching and with or without the addition of soil amendments.

tree - A woody perennial plant that reaches a mature height of at least 8 feet and has a well-defined stem and a definite crown shape. There is no clear-cut distinction between trees and shrubs. Some plants, such as willows, may grow as either trees or shrubs.

universal soil loss equation - An equation used for the design of water erosion control systems: A = RKLSPC wherein A = average annual soil loss in tons per acre per year; R = rainfall factor; K = soil erodibility factor; L = length of slope; S = percent of slope; P = conservation practice factor; and C = cropping and management factor. (T = soil loss tolerance value that has been assigned each soil, expressed T/A/Year).

valley cross section - The vertical and horizontal configuration of a valley normal to the direction of water runoff.

vegetation - Plants in general or the sum total of plant life in an area.

warm-season plant - A plant that completes most of its growth during the warm portion of the year, generally late spring and summer.

water conservation - The physical control, protection, management, and use of water resources in such a way as to maintain crop, grazing, and forest lands, vegetal cover, wildlife, and wildlife habitat for maximum sustained benefits to people, agriculture, industry, commerce, and other segments of the national economy.

water control (soil and water conservation) - The physical control of water by such measures as conservation practices on the land, channel improvements, and installation of structures for water retardation and sediment detention (does not refer to legal control or water rights as defined).

water quality standards - Minimum requirements of purity of water for various uses; for example, water for agricultural use in irrigation systems should not exceed specific levels of sodium bicarbonates, pH, total dissolved salts, etc.

water rights - The legal rights to the use of water. They consist of riparian rights and those acquired by appropriation and prescription. Riparian rights are those rights to use and control water by virtue of ownership of the bank or banks. Appropriated rights are those acquired by an individual to the exclusive use of water, based strictly on priority of appropriation and application of the water to beneficial use and without limitation of the place of use to riparian land. Prescribed rights are those to which legal title is acquired by long possession and use without protest of other parties.

watershed protection and flood prevention projects - A system of land treatment or soil conservation practices combined with structural measures installed to improve infiltration and reduce erosion of land within a drainage basin and to protect lands from floods.

waterspreading - The application of water to lands for the purpose of increasing the growth of natural vegetation or to store it in the ground for subsequent withdrawal by pumps for irrigation.

water table - The upper surface of groundwater or that level below which the soil is saturated with water; locus of points in soil water at which the hydraulic pressure is equal to atmospheric pressure.

waterway - A natural course or constructed channel for the flow of water. (See grassed waterway.)

weed - A plant out of place.

weir - Device for measuring or regulating the flow of water.

weir notch - The opening in a weir for the passage of water.

wildlife - Undomesticated vertebrate animals, except fish, considered collectively.

wildlife management - The art of producing sustained annual crops of wildlife.

windbreak - 1: A living barrier of trees or combination of trees and shrubs located adjacent to farm or ranch headquarters and designed to protect the area from cold or hot winds and drifting snow. Also headquarters and livestock windbreaks. 2: A narrow barrier of living trees or combination of trees and shrubs, usually from one to five rows, established within or around a field for the protection of land and crops. May also consist of narrow strips of annual crops, such as corn or sorghum.

wind erosion equation - An equation used for the design of wind erosion control systems. E = f(IKCLV) wherein E = average annual soil loss, expressed in tons per acre per year; f = a function of; I = soil erodibility, K = soil ridge roughness, C = climatic factor; L = unsheltered distance across the field along the wind erosion direction; and V = vegetative cover.

wind stripcropping - The production of crops in relatively narrow strips placed perpendicular to the direction of prevailing winds.

woodland management - The management of woodlands and plantations that have passed the establishment stage, including all measures designed to improve the quality and quantity of woodland growing stock and to maintain litter and herbaceous ground cover for soil, water, and other resource conservation. Some of these measures are planting, improvement cutting, thinning, pruning, slash disposal, and protection from fire and grazing.

zoning (rural) - A means by which governmental authority is used to promote the proper use of land under certain circumstances. This power traditionally resides in the state, and the power to regulate land uses by zoning is usually delegated to minor units of government, such as towns, municipalities, and counties, through an enabling act that specifies powers granted and the conditions under which these are to be exercised.

zoning ordinance - The exercise of police power for the purpose of carrying out the land use plan of an area. It may also include regulations to effect control of the size and height of buildings, population density, and use of buildings; for example, residential, commercial, industrial, etc.

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XIV APPENDIX

Exhibit 1
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STANDARDS AND GUIDELINES

For Projects Within the

Lewis & Clark County Conservation District

to

Implement the

Natural Streambed & Land
Preservation Act of 1975

Chapter No. 463, Montana
Session Laws 1975; Section
26-1510 et seq
R.C.M. 1947; Senate Bill 310
1975 Legislature

Compiled by
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Exhibit 1

INTRODUCTION

These standards and guidelines have been prepared to implement the Natural Streambed & Land Preservation Act of 1975 (also cited as Chapter No. 463, Montana Session Laws 1975; Section 26-510, et seq. R.C.M. 1947; Senate Bill 310, 1975 Legislature). The Lewis & Clark County Conservation District has adopted these standards and guidelines, after a public hearing, and final review and consideration by the Board of Supervisors. These standards and guidelines are for all projects with exclusions as stated on any natural perennial stream in the Conservation District. These standards and guidelines will meet or exceed the minimum standards adopted by the Department of Natural Resources & Conservation (DNRC). The effective date of implementation of the Natural Streambed & Land Preservation Act of 1975 will be January 1, 1976.

Any questions regarding this Act or its implementation should be directed to the Lewis & Clark County Conservation District Office, Federal Office Building, Drawer 10022, 301 South Park,(Room 106), Helena MT 59601. Phone: 449-5278.

Exhibit 1

TITLE

These standards and guidelines may be cited as the "Lewis & Clark County Conservation District Standards and Guidelines for Implementation of the Natural Streambed & Land Preservation Act of 1975".

POLICY

It is the policy of the Lewis & Clark County Conservation District that the natural rivers and streams, and the lands and property immediately adjacent to them within this District, are to be protected and preserved to be available in their natural or existing state, and to prohibit unauthorized projects; in so doing to keep soil erosion and sedimentation to a minimum, except as may be necessary and appropriate after due consideration of all factors involved. Further, it is the policy of this District to recognize the needs of irrigation and agricultural use of the rivers and streams of the State of Montana and to protect the use of water for any useful or beneficial purpose as guaranteed by the Constitution and Laws of the State of Montana.

PURPOSE

It is the purpose of these standards and guidelines to provide clear guidance to all concerned parties as to how the Natural Streambed & Land Preservation Act of 1975 is to be administered in the Lewis & Clark County Conservation District and to specify procedures for compliance with the policy as stated in the previous section.

DEFINITIONS

(1) The following definitions in the Natural Streambed & Land Preservation Act of 1975 and the State minimum standards and guidelines adopted by the State Board of Natural Resources & Conservation are applicable:

(a) "Stream" means any natural perennial flowing stream or river, its bed and immediate banks.

(b) "Person" means any natural person, corporation, firm, partnership, association, or other legal entity, not covered under Section 26-1502, R.C.M. 1947.

(c) "District" means the Lewis & Clark County Conservation District, under Title 76, Chapter 1, R.C.M. 1947, in which the project will take place.

(d) "Supervisors" means the Board of Supervisors of the Lewis & Clark County Conservation District.

(e) "Project" means a physical alteration or modification of a stream in the State of Montana which results in a change in the state of the stream in contravention of Section 26-2511, R.C.M. 1947.

(f) "Applicant" means any person presenting notice of a project to the supervisors.

(g) "Department" means the Montana Fish & Game Department.

(h) "Team" means one (1) representative of the supervisors, one (1) representative of the department, and the applicant or his representative.

(i) "Mean high water mark" means a water level corresponding to the natural or ordinary high water mark, and is the line which the water impresses on the soil by covering it for sufficient periods of time to deprive the soil of its vegetation and destroy its value for agricultural purposes.

(j) "Project area" means the area within the jurisdiction of the Act and these standards and guidelines, and includes the area within the mean high water mark on both sides of the stream. The term also includes the immediate banks to a stream as determined by the supervisors.

For the purposes of this definition, the following streams within this District are designated as natural perennial flowing streams, and are therefore subject to the jurisdiction of these rules:

MISSOURI RIVER

(Tributary)	(Sub-Tributary)	(Tributaries)
Dearborn River	Flat Creek	
	South Fork Dearborn River	
	Middle Fork Dearborn River	
	Cuniff Creek	
	Falls Creek	West Fork
		East Fork
	Blacktail Creek	
	Whitetail Creek	
	Lost Cabin Creek	
Stickney Creek	North Fork	
	South Fork	
Little Prickley Pear Creek	Wolf Creek	Rogers Creek
		Gladstone Creek
		French Creek
		Greenpole Creek
		North Fork, Lyons Creek
		South Fork, Lyons Creek
	Big Sheep Creek	
	Canyon Creek	Virginia Creek
	Marsh Creek	
	Lost Horse Creek	

MISSOURI RIVER (Continued)

(Tributary)	(Sub-Tributary)	(Tributaries)
Little Prickley Pear Creek (Continued)	North Fork Little Prickley Pear Creek	
	South Fork Little Prickley Pear Creek	
Cottonwood Creek		
Willow Creek	Elkhorn Creek	
Beaver Creek		
Prickley Pear Creek	Silver Creek	
	Ten Mile Creek	Seven Mile Creek Minehaha Creek Beaver Creek Ruby Creek
Trout Creek-York Area		

SUN RIVER (Cascade County Line to Headwaters)

Elk Creek	Smith Fork	Ford Creek
	Blubber Creek	Goss Creek
Willow Creek	North Fork Willow Creek	Barr Creek Cutrock Creek
	Little Willow Creek	
Beaver Creek		
Patrick Basin Creek		
South Fork Sun River	Bear Creek	
	Prairie Creek	
	West Fork	Aborn Creek
	Straight Creek	Wood Creek
North Fork Sun River	Moose Creek	
	Rock Creek	Red Shale Creek
	Gates Creek	
	Lick Creek	
	Open Creek	

BIG BLACKFOOT RIVER (Powell County Line to Headwaters)

Poorman Creek	South Fork	
Beaver Creek		
Stonewall Creek		

Exhibit 1

BIG BLACKFOOT RIVER (Continued)

(Tributary)	(Sub-Tributary)	(Tributaries)
Keep Cool Creek	Sucker Creek	
Humbug Creek		
Seven-Up Pete Creek		
Landers Fork	Copper Creek Falls Creek Ringeye Creek Middle Fork Creek	Snowbank Creek
Hogum Creek		
Willow Creek		
Alice Creek	Bartlett Creek	
Shuve Gulch		
Anaconda Creek		
North Fork Blackfoot River	Dry Fork, Blackfoot River	Cabin Creek Canyon Creek
	East Fork Blackfoot River Cooney Creek Dabrata Creek	

SOUTH FORK FLATHEAD RIVER

Danaher Creek	Rapid Creek Bar Creek Limestone Creek	

This listing is not exclusive since all natural perennial flowing streams within the District are included within these standards and guidelines. The District may from time to time add to or change this list, either upon its own motion or upon petition of any interested parties.

(2) In addition to the above definitions, the following additional definitions shall also apply to these standards and guidelines:

(a) "Channel change" means any visually discernible (or material) channel change in the alignment, cross-section, or longtitudinal slope of a natural perennial flowing stream within the project area as a result of man-made physical alteration or modification of the stream.

(b) "Debris" means any vegetational or refuse material in a stream channel which is interfering with a structure, and shall generally not include in-stream sand and gravel material unless the sand and gravel deposits are creating specific problems that warrant their removal.

PROHIBITIONS

No work on a project under the Act may take place without written consent of the supervisors, as provided in the Act and these standards and guidelines.

APPLICATION PROCESS

(1) Notice of Proposed Project

(a) A person planning to engage in a project will present written notice of the project to the Lewis & Clark County Conservation District before any portion of the project takes place. The notice of proposed project will be made on Form 270 as provided by the District. The notice will be hand-delivered or mailed to the District Secretary, F.O.B. Drawer 10022, 301 South Park, Room 106, Helena MT 59601. All notices of proposed projects will be officially received only on the regular monthly meeting of the Board of Supervisors (normally held on the third Monday of each month). Therefore, the official date of receipt of the application will be the date of the next monthly meeting. The applicant may appear before the Board of Supervisors at the monthly meeting to officially present the notice in order to provide additional explanation of the proposed project. (If applicant decides to attend Board meeting, he will notify the District Secretary at least three (3) days prior to the meeting by calling 449-5278.) The Lewis & Clark County Conservation District Board of Supervisors reserves the right to reject any notice of proposed project that is incomplete or contains insufficient information for review.

(b) Where a single land use activity, such as a timber sale, involves multiple locations of a single overall project, such as the placement of several culverts, application for all foreseeable stream alterations in conjunction with the land use activity may be made on a single notice (Form 270). The notice shall include a map and legal description of the proposed project. The application for multiple location projects may also make provision for necessary but unforeseen stream alterations, provided that the stream locations are identified in reasonable detail for purposes of review.

(c) The supervisors shall, within five (5) days of receipt of Form 270, examine and investigate the application and determine whether the proposal is a project. They shall, within this five-day period, send a copy of their determination on Form 271 (Supervisors's Report) to the department and the applicant. With Form 271 to the department, Form 270 shall be included. If the supervisors determine that the proposal is not a project, the applicant may proceed with the proposed activity UPON RECEIPT OF WRITTEN NOTICE THAT PROPOSAL IS NOT A PROJECT.

(2) Formation of a Team

(a) If the supervisors determine that the proposal is a project, the department shall within five (5) days of receipt of such determination from the District, notify the supervisors whether the department requests an on-site inspection by a team.

(b) The supervisors shall call a team together within twenty (20) days of receipt of the department's request for an on-site inspection. Any member of the team shall notify the supervisors in writing within five (5) days after notice of call for team inspection if he waives participation in the inspection. If the department DOES NOT request an on-site inspection within the time specified above, the supervisors may deny or approve the project or may make recommendations for alternative plans.

(c) Each member of the team shall recommend (using Form 272, Individual Team Member Report) within fifty (5) days of receipt date of application, denial, approval, or modification of the project to the supervisors. The applicant may waive participation in this recommendation.

(d) The supervisors may extend, upon request of any team member, the time limits provided in subsections (2)(c) and (3)(a) of these standards and guidelines where, in their determination, the time provided is not sufficient to carry out the purposes of the Act and these standards and guidelines. The time extension may not in total exceed one (1) year from the date of the receipt of the application. The applicant shall be notified within sixty (60) days of date of application's receipt of the initial time extension and shall be notified immediately of any subsequent time extensions.

(3) Decision of Supervisors

(a) The supervisors shall review the proposed project and affirm, overrule, or modify the individual team members' recommendations, and notify the applicant and team members within sixty (60) days of receipt of application of their decision. The decision shall be made on Form 273, Supervisors Decision Form.

(b) The decision of the supervisors shall be made by a concurrence of a majority of the supervisors.

(c) Within the sixty (60) day limit for notification of applicant of the Board's decision, such notice as includes a modification to the original application must be concurred with by the applicant within fifteen (15) days of his receipt of the modification proposal that he agrees to carry out the provisions of the modification. This concurrence is made by applicant's signing and returning the bottom portion of Form 273 to the supervisors. No work may be commenced on a project prior to the expiration of the 15-day period unless written permission is given by all team members on Form 273. If the written decision of the supervisors is approval of the project without recommendation or alternative plan, the applicant may proceed with the project upon the expiration of ten (10) days from receipt of the Board's decision.

ARBITRATION

(1) When a team member disagrees with the Board's action, he may ask, within five (5) days of receipt of the supervisors' decision, that an arbitration panel, as provided in subsections (2) and (3) of this section, be appointed to hear the dispute and make a final written decision thereon.

(2) The arbitration panel shall consist of three (3) members chosen by the senior judge of the judicial district in which the dispute takes place. The members shall be residents of that judicial district at the time of selection. This panel shall sit for only that period of time necessary to settle the dispute before it and will review the proposed project in line with the policy set forth in the previous section on policy.

(3) Cost of the arbitration panel, computed as for jurors' fees under Section 25-401, R.C.M. 1947, shall be borne by the contesting party or parties; all other parties shall bear their own costs.

(4) Modification of plan -- cost sharing. If the final decision of the arbitration panel requires modifications or alterations from the original project plan as approved by the supervisors, the arbitration panel shall include in its decision any part or percent of these modifications or alterations that is for the direct benefit of the public and it shall assign any costs to the proper participant. Any of the involved entities may withdraw or modify any required modification of the project within ten (10) days after decision.

REVIEW PROCESS

(1) The following items shall be among those considered by the District prior to making a decision on a proposed project:

(a) The purpose of the project;

(b) The necessity and justification for the proposed project;

(c) Whether the proposed project is a reasonable means of accomplishing the purpose;

(d) Whether there are modifications or alternative solutions which are reasonably possible and which would reduce the disturbance to the stream channel and its environment and better accomplish the purpose of the proposed project;

(e) Whether the project will pass anticipated sediment loads without creating harmful flooding or erosion problems upstream or downstream;

(f) Whether the project will interfere with public and private property.

(2) No project may be approved unless reasonable efforts will be made consistent with the purpose of the project to:

(a) Minimize the amount of stream channel alteration;

(b) Insure that the project will be as permanent of a solution as possible and that the method used will create a reasonably permanent and stable situation;

(c) Insure that the project will pass anticipated water flows without creating harmful erosion problems upstream or downstream;

(d) Minimize effects on fish and aquatic habitat;

(e) Minimize turbidity or other water pollution problems by the materials used or removal of ground cover;

(f) Minimize adverse effects on the natural beauty of the area;

(g) Insure that the project will comply with these rules;

(h) Insure that streambed gravels will not be used in the project unless there is no reasonable alternative.

PROJECTS

The following are projects subject to the Act and these standards and guidelines if the construction or work on the same is to be carried out in the project area of a natural perennial flowing stream:

(1) Channel changes;

(2) New diversions (including pumping stations);

(3) Riprap and other streambank protection projects;

(4) New dams and reservoirs;

(5) Jetties;

(6) Commercial, industrial, and residential development;

(7) Grade stabilization structures;

(8) Stream channel stabilization projects;

(9) Bridges and culverts;

(10) Recreational facilities, including boat docks, marinas, and swimming areas;

(11) Brush removal operations by mechanical, spraying, or other means along stream channels (see exclusions on next page). This includes all areas twenty-five (25) feet from streambank;

(12) Tree cutting on erosive sites along stream channels.

CONSTRUCTION STANDARDS

The following construction standards shall apply to all projects:

(1) Projects will be constructed in accordance with the USDA Soil Conservation Service Practice Standards and Specifications as adopted by the Lewis & Clark County Conservation District and consistent with the policy, purpose, and review procedure of these standards and guidelines. If a project is proposed for which there are no SCS Standards and Specifications which apply, the project shall be constructed in accordance with such standards and specifications as the Conservation District deems appropriate or may establish consistent with the policy, purpose, and review procedure of these standards and guidelines. All USDA Soil Conservation Service Practice Standards as adopted by the Lewis & Clark County Conservation District are available at the District Office, Room 106 of the Helena Federal Office Building, 301 South Park, Helena MT 59601.

(2) Any temporary crossing, bridge supports, cofferdams, or other structures that will be needed during the period of construction shall be designed to handle high flows that could be anticipated during the construction period. All temporary structures shall be completely removed from the stream channel at the conclusion of construction and the area shall be restored to a natural appearance.

(3) Care shall be taken to cause only the minimum disturbance necessary to the natural appearance of the area. Streambank vegetation shall be protected except where its removal is absolutely necessary for completion of the work. Any vegetation, debris, or othe material removed during construction shall be disposed of at some location out of the stream channel where it cannot re-enter the channel during high stream flows. All new cut or fill slopes that will not be protected with some form of riprap shall be vegetated or otherwise protected to prevent erosion.

(4) The District may limit the period of construction as is necessary to minimize serious conflicts with fish migration and spawning, recreational use, and downstream uses.

EXCLUSIONS

The following items are not projects and no application for permit is required:

(1) A water user or his agent in cleaning, maintaining, or repairing any diversion facility, canal, ditch, or lateral or in removing any obstruction from a stream channel which is interfering with the delivery of water under a valid existing water right or water use permit so long

as the action does not alter the existing stream channel.

(2) Removal of debris from a stream channel, provided that material removed will be disposed of at some point outside the channel where it cannot again re-enter the channel, and provided further that such removal does not constitute a project as listed in the "Projects" section of these standards and guidelines.

(3) The spraying of weeds along stream channels will be allowed if the Lewis & Clark County Weed District has determined these weeds to be noxious. All other spraying along stream channels constitutes a project subject to approval by the Board of Supervisors.

INSPECTION OF PROJECTS

The supervisors or their designated representative may inspect any project during or after construction to insure that proper construction practices are being employed and to provide technical assitance to the applicant. The District shall notify the landowner prior to entering his land to inspect a project, either orally or in writing.

EMERGENCIES

(1) The provisions of these standards and guidelines shall not apply to those actions which are necessary to safeguard life or property, including growing crops during periods of emergency. The person responsible for any project under this section shall notify the supervisors in writing within fifteen (15) days of the action taken as a result of an emergency.

(2) The supervisors shall send one (1) copy of the emergency action notice within five (5) days of the District's receipt to the department.

(3) A team, called together as described, shall make an on-site inspection and make individual written reports to the supervisors within thirty days of receipt of the emergency notification, giving their observations and opinions on the emergency project.

(4) If the same or similar emergency occurs to the same applicant more than once within a five (5) year period, the supervisors shall request the team members to include in their reports a determination of the validity of the emergency action and to ascertain the feasibility of a more permanent solution to that emergency action.

(5) The supervisors shall determine the feasibility of a more permanent solution and shall recommend within thirty days that the person put the solution into effect within a reasonable period of time, as determined by the supervisors. Failure of a person to put that solution into effect is not a violation of the Act and these standards and guidelines unless a subsequent emergency action results from this failure.

(6) When a member of the team or the applicant disagrees with the Board's recommendation, he may sak that an arbitration panel be appointed to hear the dispute and make a final written decision thereon.

COMPLIANCE WITH OTHER LAWS

(1) Approval for proposed projects or alternate plans does not relieve the applicant of the responsibility of complying with Title 89, Chapter 35 R.C.M. 1947, floodway management and regulation where designated flood plains or designated floodways have been established in accordance with that chapter.

(2) No action under these standards and guidelines shall impair, diminish, divest, or control any existing or vested water rights under the laws of the State of Montana or the United States.

HEARINGS

(1) The District may hold a public informational hearing when a proposed project appears to be controversial, or where additional information is desired prior to final action by the Board.

(2) The District shall conduct a public hearing before adopting any major changes in these standards and guidelines.

(3) Notice of a public hearing to be conducted under subsections (1) and (2) of this section shall be given in writing at least ten (10) days in advance to all directly affected parties in the case of a hearing under (1) above, and by newspaper article in the case of a hearing under (2) above.

PENALTY-MISDEMEANOR-RESTORATION

(1) As provided by Section 26-1523, R.C.M. 1947, any person initiating a project without written consent of the supervisors is guilty of a misdemeanor and upon conviction shall be punished by a fine of not less than $25.00 nor more than $500.00 for each day that person continues to physically alter or modify the stream; and in addition, that person shall restore at the discretion of the court, the damaged stream, as recommended by the team and approved by the supervisors, to as near its prior condition as possible.

(2) Any person or entity who violates the time provisions of the Act is guilty of a misdemeanor and upon conviction shall be punished by a fine of $5.00 per day.

COOPERATIVE AGREEMENTS

(1) The Lewis & Clark County Conservation District will enter into cooperative agreements with adjoining Districts which involve mutual streams or streams that form boundaries. These agreements will outline procedures for the cooperative notification of each other in the approval of projects on adjoining and mutual streams.

Exhibit 1

(2) County, State, and Federal units of government will be notified of projects involving jurisdictional direction by these units.

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Exhibit 2

LEWIS AND CLARK COUNTY CONSERVATION DISTRICT
SEDIMENT CONTROL ORDINANCE
Number 77-01

Section 1. TITLE

This ordinance may be cited as the "Lewis and Clark County Conservation District Soil Erosion and Sediment Control Ordinance" as authorized in the Montana Conservation District Law (Section 76-109, R.C.M 1947).

Section 2. POLICY

It is the policy of the Lewis and Clark County Conservation District to provide for the conservation of the soil and water resources of the district, and for the prevention and control of accelerated soil erosion and sediment damage to our land, water, and other resources.

Section 3. PURPOSE

It is the purpose of this ordinance to enact a comprehensive and coordinated erosion and sediment control program for the conservation and protection of land, water, and other resources of the district and thereby (a) encourage the use of land in accordance with its capabilities and treat it according to its needs; (b) prevent degradation of lands, streams, reservoirs, and lakes; and (c) protect and promote the health, safety, and general welfare of the people.

Section 4. DEFINITIONS

For the purpose of this ordinance, the following definitions shall apply:

(1) "Erosion" means the process by which the surface of the land is worn away by the action of water, wind, gravity, or a combination thereof.

 (a) "accelerated erosion" means erosion much more rapid than normal erosion or geologic erosion influenced primarily as a result of the activities of man.

 (b) "geologic erosion" means the wearing away of the earth's surface by water, ice, or other natural agents under natural conditions of climate, vegetation, etc., undisturbed by man.

 (c) "normal erosion" means the gradual erosion of land used by man which does not greatly exceed geologic erosion, where all reasonable soil and water conservation practices have been applied.

(2) "Best Management Practices" means the land management guidelines for the prevention and control of accelerated erosion and sediment damage adopted by the district pursuant to Section 5 of this ordinance.

(3) "Conservation Plan" means the properly-recorded decisions of the cooperating landowner or occupier on how he plans to use his land within its capability and to treat it according to its needs for

Exhibit 2

the maintenance or improvement of soil, and water and plant resources, in accordance with the best management practices of the district.

(4) "Construction/Subdivision Activity" means any physical disturbance by man of the land associated with construction or subdivision activities which may result in accelerated erosion from water or wind and the movement of sediment into water or onto land within the district. These activities include, but are not limited to, clearing, grading, excavating, transporting, and the filling of lands.

(5) "District" or "Conservation District" means the Lewis and Clark County Conservation District, an existing legal political subdivision of the State of Montana. The boundaries of the district include all the territory within Lewis and Clark County excepting the incorporated cities of Helena and East Helena as of June 25, 1948.

(6) "Land Occupier" means any person, firm, corporation, municipality, or other legal entity who holds title to, or is in possession of, any lands lying within the district, whether as owner, lessee, renter, tenant, or otherwise. Where the term land occupier is used in this ordinance, the term shall include both the owner and the occupier of the land when they are not the same.

(7) "Operator" (forestry activities) means the person responsible for the timber harvesting activities.

(8) "Person" means any natural person, individual, corporation, firm, partnership, association, municipality, governmental agency, political subdivision, or other legal entity.

(9) "Sediment" means the solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice, and has come to rest on the earth's surface.

(10) "Sediment Damage" means the economic or physical damage caused to any person or natural resource resulting from accelerated erosion.

(11) "Sedimentation" means the process or action of depositing sediment.

(12) "Supervisors" or "District Supervisors" means the board of supervisors of the Lewis and Clark County Conservation District.

(13) "Water" means any and all surface waters, public or private, which are contained within, flow through, or border upon Lewis and Clark County.

(14) "Team" (comprised of three members) means one of the supervisors or their designated representative, one representative of the State Forestry Division of the Montana Department of Natural Resources and Conservation with qualifications in erosion and sediment control, and the land occupier, operator, or their designated representative.

(15) "Timber Harvesting" means any activity related to the cutting or removal of forest tree species for commercial use.

Section 5. BEST MANAGEMENT PRACTICES

(A) The supervisors adopt the attached addendum of Best Management Practices, dated April 18, 1977, as their guidelines for the prevention and control of accelerated erosion and sediment damage for agricultural activities, subdivision/construction activities, and forestry activities.

(B) The Best Management Practices shall include the management, techniques, and methods for control of accelerated erosion and sediment damage resulting from the activities of man.

(C) Any proposed changes in these Best Management Practices shall require due notice, public hearing and referendum as required by the Montana Conservation District Law (Section (A) 76-109, R.C.M. 1947).

(D) Any qualified elector within the district may at any time file a petition with the district supervisors asking that any or all of the Best Management Practices adopted pursuant to this ordinance be amended, supplemented, or repealed.

(E) If corrective measures are necessary for which there are no applicable Best Management Practices, the accelerated erosion and sediment problem shall be corrected with practices which the supervisors deem appropriate or may establish consistent with the policy and purpose of this ordinance.

(F) The Best Management Practices shall be available for public inspection during normal office hours at the Lewis and Clark County Conservation District Office located in Helena, Montana.

Section 6. COMPLIANCE WITH ORDINANCE

(A) No land occupier or person may cause or conduct, contract for, or authorize any activity which causes accelerated erosion or sediment damage within the district.

(B) Failure of any land occupier to follow the Best Management Practices adopted under Section 5 of this ordinance may be considered only as evidence to show that the land occupier is causing or has caused accelerated erosion or sediment damage; compliance with selected Best Management Practices or practices which the supervisors deem appropriate is required when the supervisors determine that a violation of Section 6(A) exists.

Section 7. AGRICULTURAL ACTIVITIES

Any land occupier of agricultural lands shall be considered in compliance with this ordinance if (1) his land is being managed in accordance with his conservation plan currently approved by the supervisors of the district, or (2) his land management practices meet or exceed the supervisors' best management practices.

Section 8. FORESTRY ACTIVITIES

(A) Any land occupier engaged in timber harvesting activities on private forest lands who has a district-approved conservation plan which includes a woodland management section for erosion and sediment control, or any land occupier who has a long-range timber harvesting plan which includes an erosion and sediment control section approved by the district and is conducting his operation in accordance with the plan, shall be deemed to be in compliance with this ordinance.

(B) Any land occupier planning to engage in timber harvesting who does not have a district-approved erosion and sediment control section in his timber harvesting plan shall either (1) enter into a district cooperative agreement for a conservation plan as explained in Section 8(A), or (2) submit notification to the district office of his proposed timber harvesting plans on Lewis and Clark County Conservation District Timber Harvest Form available at the district office at least ten working days prior to initiating any timber harvesting activities. Such notification shall include, as a minimum, the following information:

1. name, address, and telephone number of landowner(s) and logging operator(s);
2. legal description of proposed timber harvesting activities;
3. description of proposed operation;
4. plat map of the area showing all water bodies, roads, and erosion control structures;
5. signatures of the landowner(s) and operator(s) agreeing to conduct all timber harvesting activities, which include the construction and location of all roads, in accordance with the adopted erosion and sediment control guidelines for timber harvest.

(C) The supervisors or their designated representative shall review information provided on the notification form and other existing data (soils, topography, etc.) to determine whether the proposed activities may require a more comprehensive erosion and sediment control plan.

1. If it is determined that the proposed activities present no serious potential erosion and sediment problems, the land occupier will be notified in writing within five working days of receipt of notification that he may proceed with the timber harvesting.

2. If it is determined that an erosion and sediment control plan may be necessary to prevent potential sediment damage, the land occupier will be so notified in writing within five working days of receipt of notification that a team will conduct an on-site inspection. Such on-site inspections will be conducted on a date agreed upon by the land occupier and the supervisors or their designated representative.

   a. If, after the on-site inspection, the team determines that a comprehensive erosion and sediment control plan is not necessary, the land occupier will be notified in writing within five working days of the investigation that he may proceed with his operations.

   b. If, after the on-site inspection, the team determines that an erosion and sediment control plan is necessary, the supervisors or their designated representative shall, within five working days of the investigation so notify the land occupier in writing and offer technical assistance as may be available for the development of a satisfactory erosion and sediment control plan.

      (i) an acceptable erosion and sediment control plan shall be completed prior to any timber harvesting.

      (ii) when the erosion and sediment control plan is acceptable to both the supervisors and the land occupier, both parties will sign the plan agreeing to the terms specified therein.

Section 9. CONSTRUCTION/SUBDIVISION ACTIVITIES

(A) Any person planning to engage in construction/subdivision activities shall submit an erosion and sediment control plan to the district supervisors at the Lewis and Clark County Conservation District Office for their approval prior to any disturbance of the land. Technical assistance of the district is available upon request for the preparation of the erosion and sediment control plan.

1. The erosion and sediment control plan shall contain, as a minimum, the following information:

   (a) name, address, and telephone number of the applicant;

   (b) topographic map showing location of the proposed activity;

   (c) soils information;

   (d) time schedule indicating the anticipated starting and completion dates of the development sequence and the estimated time of exposure for areas of soil disturbance prior to the completion of effective measures for erosion and sediment control.

2. The supervisors shall, within 30 days, review all plans submitted and approve any such plans that meet the supervisors' best management practices. When the plan submitted for approval is found to be inadequate, the supervisors shall notify the person in writing within said 30 day period of any necessary modifications, terms, and conditions as will permit approval of the plan.

(B) Any person engaged in construction/subdivision activities, who is conducting his activities in accordance with his erosion and sediment control plan as approved by the supervisors shall be deemed to be in compliance with this ordinance.

(C) Exclusions:

An erosion and sediment control plan will not be required for the following:

1. the construction of single-family residences when they are constructed by or under contract with the owner for his own occupancy;
2. activities such as home gardening, individual home landscaping, repairs, and maintenance work;
3. the construction of farm buildings;
4. any project carried out under the technical standards and specifications of the USDA Soil Conservation Service;
5. any activity in which a plan has been submitted to and approved by a state or county agency which meets the best management practices of the supervisors.

Section 10. EMERGENCY LAND MANAGEMENT PRACTICES

No prior notification is required for emergency land management practices necessitated by and initiated during or immediately after fire, flood, windstorm, earthquake, structural failure or other catastrophic events. Within five days after commencement of such activity, the land occupier shall notify the supervisors of the action with an explanation of why emergency action was necessary. Responsible care must be taken to minimize soil disturbance and erosion during the conduct of emergency land management practices.

Section 11. COMPLAINTS

(A) Land occupiers, supervisors, or state and county officials responsible for the maintenance of water quality in the district, may file a complaint against any person alleging that accelerated erosion or sediment damage has occurred or is occurring.

(B) The complaint shall: (1) include the name and address of the complainant; (2) be in writing, signed, notarized, and delivered to the district office; (3) include the date and location of the alleged violation; (4) describe the source nature and extent of the accelerated erosion or sediment damage alleged to have occurred or is occurring; and (5) become public record on file at the district office.

Section 12. ACTION INITIATED BY COMPLAINTS

(A) The supervisors or their designated representative, upon the receipt of a complaint conforming with Section 11, shall notify the alleged violator within five working days after receipt of the complaint and arrange for a time with the land occupier or his designated representative to conduct an investigation within 20 days to determine whether an actual violation exists. The complainant shall be notified of the time of the investigation and will be given the opportunity to be present when the investigation is conducted. The investigation shall include, where deemed appropriate by the supervisors:

1. soils information
2. location of the alleged violation;
3. description of the source, nature, and extent of the sediment damage; and
4. a cost benefit analysis (private vs. public benefits).

(B) Where the supervisors determine that accelerated erosion or sediment damage has occurred or is occurring, they will proceed to seek a voluntary solution to the problem using the following sequence:

1. The supervisors shall, within five working days of the investigation, provide written notification to the land occupier that an apparent violation of this ordinance exists with a copy to the complainant.
2. The supervisors or their designated representative shall, at the earliest possible date, discuss alternative solutions with the land occupier, offer technical assistance in bringing about an acceptable solution, and provide information regarding financial assistance.
3. The supervisors or their designated representative shall specify, in writing, a reasonable length of time to complete the corrective measures.
4. The supervisors or their designated reprsentative shall inform the land occupier that he may use other than district assistance to bring about a satisfactory solution.

Exhibit 2

(D) If the land occupier disagrees with the results of the supervisors' investigation, he shall be given an opportunity to meet with the supervisors at their next regular monthly meeting to review their decision.

(E) If the supervisors find no reason to reverse their prior decision, they shall, within five working days of the meeting, notify the land occupier in violation by certified mail that he has 20 days to adequately demonstrate to the satisfaction of the supervisors his intention to proceed voluntarily towards correction of the violation, after which time, if there remains no indication of definite action to initiate corrective measures, the supervisors may file a petition with the district court in accordance with Section 76-110, R.C.M. 1947 of the Montana Conservation District Law.

(F) The supervisors shall notify the complainant in writing of their final decision and their prescribed procedure to correct the violation.

Section 13. BOARD OF ADJUSTMENT

(A) A board of adjustment shall be established by adoption of this ordinance in accordance with the provisions of Section 76-111, R.C.M. 1947 of the Montana Conservation District Law.

(B) As required by law, the board of adjustment shall be made up of three members, each to be appointed for a term of three years; except that the members first appointed shall be appointed for terms of one, two, and three years, respectively.

(C) As required by law, the members of the board of adjustment shall be appointed by the Department of Natural Resources and Conservation with the advice and approval of the district supervisors.

(D) All meetings of the board of adjustment shall be open to the public and all of its records and proceedings shall be public.

Section 14. APPEAL TO THE BOARD OF ADJUSTMENT

Any person against whom a complaint has been filed may, within 60 days after notification that a violation of this ordinance exists, appeal to the board of adjustment if there are practical difficulties or unnecessary hardships involved in his carrying out upon his lands the corrective measures recommended by the supervisors. The board of adjustment shall have the power to authorize such variance where not contrary to the public interest or in denial of the spirit of this ordinance.

Upon the decision reached by the board of adjustment, the supervisors may appeal to the district court requesting that the order of the board of adjustment be modified or set aside in accordance with Section 76-111, R.C.M. 1947 of the Montana Conservation District Law.

Section 15. ORDER TO CEASE AND DESIST OPERATIONS

The supervisors shall have authority to initiate a court order to cease and desist against any person disturbing the land which results in accelerated erosion and sediment damage.

Section 16. COMPLIANCE WITH OTHER LAWS

Approval for any proposed land disturbance does not relieve, impair, diminish, divest, or control any existing laws of the State of Montana or the United States.

Section 17. FINANCIAL ASSISTANCE

When a land occupier is required to apply conservation practices for the control of soil erosion and sediment damage, as specified by the supervisors, the supervisors may assist the land occupier to obtain available cost-share funds from existing sources. If the supervisors determine that public funds should be made available to help correct a violation, the land occupier may be permitted to delay corrective measures until such time that the funds are made available. The lack of available funds might be considered a practical difficulty for the purposes of this ordinance, and may justify a variance from the time standards set by the supervisors. The supervisors are authorized to receive from federal, state or other public or private sources, financial, technical, or other assistance for use in accomplishing the purposes of this ordinance.

Section 18. LIABILITY

Neither the approval of a plan or any other action of the district or the supervisors under the provisions of this ordinance, nor the compliance with the provisions of the ordinance shall relieve any person from the responsibility for damage to any person or property otherwise imposed by law, nor impose any liability upon the district or the supervisors for damage to any person or property.

Section 19. SEPARABILITY CLAUSE

If any section, clause, or portion of this ordinance shall be held by a court of competent jurisdiction to be invalid or unconstitutional, such finding shall not affect any other section, clause, or portions of this ordinance.

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Exhibit 3

GUIDELINES FOR FORESTRY ACTIVITIES

Lewis & Clark County Conservation District
Sediment Control Program

A. FOREST ROADS:

1. Road Location and Design

Forest roads are constructed for a variety of standards and put to a variety of uses. Road construction and use has been shown to be the major contributor to sediment production in forested areas.

Proper road location and design has been shown to significantly reduce water pollution from forest roads. The following location and design guidelines have been shown to accomplish this purpose.

-Minimize road cuts and fills, and place structures to handle expected surface runoff from the area.

-Minimize the number of roads constructed through comprehensive road planning, recognizing all foreseeable future uses.

-Design road and locate road to avoid steep slopes, erodible soils, and geological hazard areas.

-Design road profiles and structures to prevent or disperse surface runoff from the running surface by outsloping or ditching where necessary.

-Design road with short- and long-term stabilization of cut and fill slopes as well as the road surface.

-Design road to make seasonal use needs and maintenance activities compatible with minimizing erosion from the road.

-Fit road to landscape to avoid concentrating runoff in areas which cannot adequately handle such increased runoff. Design drainage so that water is dumped over the end of a ridge rather than in a draw. This will disperse rather than concentrate water.

-Avoid long sustained road grades.

-Avoid creek bottom road locations which place the road or fill with the high water lines of streams.

-Seek to maintain all vegetation between roads and streams to assist in preventing sediment from entering the stream.

Exhibit 3

- Design drainage structures and bridges to function under long-term use.

- Minimize the number of stream crossings.

2. Road Construction

Road construction exposes mineral soil, creates sloping erodible surfaces, and alters surface drainage patterns of the area. The following guidelines will minimize water pollution from the actual construction process.

- Avoid unnecessary soil and vegetation disturbance at stream crossing sites and adjust road drainage to prevent it from entering the stream.

- Compact and protect road fills in the highwater zone of streams to avoid loss of fill material.

- Roll the grade and gently outslope the road wherever possible to disperse surface runoff.

- Deposit waste material only in areas which will not enter streams during high water or during the runoff period.

3. Road Maintenance

Permanent Roads:

- Maintain running surface by reshaping and gravelling to avoid rutting and resultant accelerated erosion of the road surface.

- Annually, prior to the runoff period, inspect erosion control and drainage structures to insure they are in satisfactory condition. This should be done in the fall as many roads are inaccessible in the spring during the runoff period.

- Restrict use of road during the spring breakup period or at other times when road damage is likely to occur.

- Promote or maintain vegetation on the road surface and cut and fill slopes to stabilize such surfaces.

- Use oils or water to reduce the dust from heavy use during dry periods.

- All chemical or oil applications to the road surface should be in such a manner as to prevent immediate or delayed contamination of streams and water bodies.

Temporary Roads:

Temporary roads should be stabilized after use and may be closed to further use. The following guidelines apply to temporary roads.

-Drainage and erosion control structures should be designed to require no further maintenance after the period of use is ended.

-Stabilization of the road surface and cut and fill slopes by vegetation is the preferred method of stabilizing exposed mineral soil surfaces.

-Use of such roads that would cause damage to the road surface and erosion control structures should not be permitted.

4. Bridges, Culverts, and Stream Crossings

These three situations require special attention to assure that a minimum amount of water pollution is generated by their operation or use. The following guidelines will minimize water pollution possibilities by keeping the water flowing where it would flow naturally.

a. Bridges:

-Stabilize and protect bridge approaches by the use of vegetation and physical means such as riprap to above the highwater mark.

-Maintain structural integrity of bridge by periodic inspection and maintenance to avoid the chance of sudden structural failure and loss of fill material.

-Align bridge perpendicular with flow of stream.

b. Culverts:

-Place culvert in such a manner that its continued function is not impaired.

-Size culvert so that anticipated peak flows will be handled without failure. Design system roads for 25-year flow at a minimum.

-Protect fill slopes from culvert discharge to avoid loss of fill material.

-Remove debris from ditches above the culvert intake and upstream from a culvert stream crossing for a minimum distance of 50 feet for culverts under 24 inches in diameter.

Exhibit 3

-Avoid sloping culverts greater than three degrees from the horizontal.

-Compact fill around culvert during placement to avoid failure by undercutting.

-Avoid excavation of streambed during the placement of culverts.

-Align culvert parallel to flow.

-Use mitered inlets (where needed) on culverts so they will operate at optimum efficiency.

c. Stream Crossings:

-Do not locate stream crossings on strictly a grade basis. Choose stable site and adjust grade to it.

-On stream crossing where placement of a culvert or bridge is not desirable, locate crossing site on a stable rocky portion of the stream.

-Avoid using this type of unimproved stream crossing whenever possible.

B. FOREST PRODUCT HARVESTING OPERATIONS

Forest product harvesting operations remove or modify existing vegetation and expose and rearrange the soil surface. The following guidelines attempt to minimize water pollution resulting from this operation.

1. Tree Cutting

-Avoid falling trees or leaving other organic debris in streams or water bodies. Remove all such trees and debris as soon as possible.

2. Skidding

-On moderate and steep slopes, skid trails should be constructed in such a way as to avoid concentrating runoff. Erosion control measures such as water bars or kelley humps should be installed in the fall before the runoff period.

-Where large areas of mineral soil have been exposed and natural revegetation is inadequate to prevent accelerated erosion, seeding of skid trails should be carried out before the next growing season. Placing hay or straw on skid trails before snowfall will retard erosion in the spring.

-Dozer skidding on steep slopes with the blade attached to slow descent should not be used because of the creation of vertical erosion channels.

-Do not skid trees through streams or bodies of water.

-Whenever possible suspend the head end of the log to minimize soil gouging.

-Use a logging system which minimizes damage to area. Steep slopes and erodible soils require special skidding equipment and logging techniques.

3. Decking

-Avoid decking logs in or immediately within the highwater mark of any stream or body of water.

-Provide a vegetative buffer between landing areas and streams or bodies of water. Surface drainage from landings should not be allowed to directly enter stream channels.

-After use, landings should be revegetated as quickly as possible.

4. Processing in the Woods

-Small sawmilling operations frequently occur in the woods. Residue from these operations can affect water quality if insufficient care is taken. General guidelines to reduce water pollution from these activities include: avoid depositing residue (slabs, edging, sawdust, and branches) within the high-water boundaries of streams or bodies of water.

C. SITE PREPARATION AND SLASH DISPOSAL ACTIVITIES

In connection with various forest practices, the forest floor is intentionally disturbed for the purpose of creating a suitable mineral soil surface or to modify an existing unsatisfactory condition, such as the disposal of logging slash or competing vegetation. Such activities generally expose mineral soil and reduce the protective effect of existing vegetation thus increasing both erosion potential and sediment production from the area. The following guidelines are directed at reducing the amount of pollutants resulting from this practice and are in addition to those provided on the State of Montana's Hazard Reduction fact sheet.

General

-The amount of mineral soil exposed should be minimized wherever possible to achieve the stated management goal.

-Scarification should be minimized or eliminated on highly erodible soils or in geologic hazard areas where soil mass movements are highly likely.

-Generally, the less soil disturbance that occurs during site preparation or slash disposal activities, the less sediment will be produced from the area.

-Adequate vegetative buffer strips should be maintained between site preparation areas and water bodies (ponds, lakes, etc.), flowing water (rivers and streams), or intermittent channels.

1. Mechanical Scarification - Scarification

-Mechanical scarification activities by bulldozers and other equipment on slopes should minimize or eliminate elongated mineral soil surfaces perpendicular to the slope.

-Use brush blades on cats when piling slash. Use of dozers with angle blades generally creates active sediment-producing erosion surfaces particularly on slopes. Site preparation equipment producing irregular exposed surfaces are preferred.

-Use of cats may be restricted as to time of year depending on soil-water conditions.

2. Prescribed Burning

-An unburned buffer strip should be provided between prescribed burned areas and all water bodies (ponds, lakes, streams, etc.) to prevent surface runoff into these areas.

-Prescribed burning activities within any given drainage should be timed and coordinated to minimize impact to water bodies within the drainage.

3. Chemical Site Preparation Methods

Such chemicals are generally used to reduce or eliminate competing vegetation. However, the elimination of such vegetation reduces the general vegetative cover of the area increasing the likelihood of pollution from increased sediment production and chemical contamination.

-Chemical methods of vegetation control should not include direct application of chemicals to water bodies. Suitable buffer strips should be provided between chemical application areas and all water bodies.

-During chemical application operations, mixing and disposal of chemicals should not be considered in such a way as to allow direct entry of chemicals into drainage ways or water bodies.

D. REFORESTATION AND AFFORESTATION

A variety of artificial and natural methods are used to reestablish or establish forest stands. Water pollution from these activities is generally indirect resulting from site preparation and/or slash disposal practices.

-Rapid reforestation of harvested areas is encouraged to rapidly reestablish long-term protective vegetative cover on the area. Short-term low vegetative cover which does not unduly hinder the establishment of trees should be considered.

-Mechanical tree planting of erodible soils on slopes should be on the contour whenever possible. Minimum site preparation to meet reforestation objectives should be the reforestation goal in such situations with preference given to spot planting whenever possible.

E. INTERMEDIATE STAND TREATMENT

Intermediate stand treatment is all treatments or cuttings made in the stand after the stand has been reproduced but prior to maturity. Intermediate cutting can be used to control stand density (thinning), to regulate species composition and quality in young stands (release cutting), to improve the composition and quality of older stands (improvement cutting), and to remove branches (pruning). For the most part, little direct effect occurs on water quality except in the following situations:

-Deposition of branches and other organic debris from these practices in water bodies and drainage ways.

-Significant removal of streamside trees and vegetation resulting in increased stream temperatures or destabilization of streambanks.

-Skidding commercial forest products through streams or drainage ways.

-Construction of roads and skid trails in such a manner that significant quantities of sediment are deposited in water bodies and/or continuous erosion surfaces are created.

-Deposition of fertilizers in water bodies or drainage ways. This can occur during aerial application of fertilizers.

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Exhibit 4

GUIDELINES FOR CONSTRUCTION/SUBIDIVISION ACTIVITIES

Lewis & Clark County Conservation District
Sediment Control Program

Land-disturbing activities shall require as a minimum that the following guidelines be met:

(a) Stripping of vegetation, regrading, and other development activities shall be conducted in such a manner so as to minimize erosion.

(b) Cut-fill operations must be kept to a minimum.

(c) Development plans must conform to topography and soil type so as to create the lowest practicable erosion potential.

(d) Whenever feasible, natural vegetation shall be retained, protected, and supplemented.

(e) The disturbed area and the duration of exposure to erosive elements shall be kept to a practicable minimum.

(f) Disturbed soil shall be stabilized as quickly as practicable.

(g) Temporary vegetation or mulching shall be employed to protect exposed critical areas during development.

(h) Permanent vegetation and structural erosion control measures must be installed as soon as practicable.

(i) To the extent necessary, sediment in runoff water must be trapped by the use of debris basins, sediment basins, silt traps, or similar measures until the disturbed area is stabilized.

(j) Adequate provisions must be made to minimize damage from surface water to the cut face of excavations or the sloping surfaces of fills.

(k) Cuts and fills may not endanger adjoining property.

(l) Fills may not encroach upon natural water courses or constructed channels in a manner that will adversely affect other property owners.

(m) Grading equipment must cross flowing streams by the means of bridges or culverts except when such methods are not feasible and, in any case, provided that such crossings are kept to a minimum.

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Exhibit 5
Page 1

SUPPLEMENT TO MEMORANDUM OF UNDERSTANDING
BETWEEN THE LEWIS & CLARK COUNTY CONSERVATION DISTRICT
AND THE
MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

This is a supplement to the Memorandum of Understanding entered into between LEWIS & CLARK COUNTY Conservation District (CD) and the Montana Department of Natural Resources and Conservation (DNR&C) on the 23rd day of August, 19 73. The purpose of this supplement is to provide the basis for a non-point source pollution control program involving the preceding agencies and the Montana Department of Health and Environmental Sciences (DHES).

LEWIS & CLARK COUNTY Conservation District, DNR&C, and DHES shall cooperate to develop and implement a water quality management plan pursuant to the authorities, responsibilities and goals outlined in Section 208 of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500) and the Federal Clean Water Act of 1977 (P.L. 95-217), and the Montana Water Pollution Control Act (Section 69-4801 et. seq., R.C.M. 1947).

LEWIS & CLARK COUNTY Conservation District is, by this agreement, designated by the Montana Department of Health and Environmental Sciences, as the non-point source water quality management agency within the District's boundaries with responsibilities as herein enumerated, and DNR&C is assigned the responsibility of state coordination of the efforts of all Montana conservation districts.

Soil conservation and water quality are mutual concerns of the Conservation District, DHES, and DNR&C; therefore, the parties agree as follows:

I. DNR&C shall within statutory, administrative, and funding limitations:

    A. Develop jointly with DHES guidelines for the CD's use in developing its water quality plan. These guidelines shall include methods for inventory assessments, planning, and policy alternatives, which when implemented will prevent or correct non-point source pollution problems. DNR&C shall seek the assistance of the Montana Association of Conservation Districts and the Soil Conservation Service (SCS) of the U.S. Department of Agriculture in the development of these guidelines.

    B. Provide assistance to the CD in the selection and adoption of best management practices to fit local needs.

    C. Cooperate with DHES in providing education, information and other assistance in the area of water quality management to the CD.

    D. Serve as state-wide coordinator and act as liaison between the CD, DHES, Environmental Protection Agency (EPA), and other agencies as necessary.

    E. Review and evaluate the CD's annual work report.

Exhibit 5

II. DHES shall within statutory, funding, and administrative limitations:

A. Provide upon request technical assistance to the CD in the development of a water quality management plan.

B. Assist in obtaining financial support for the CD for the development and implementation of the water quality management plan. As monies for rural water quality programs become available, DHES shall, to the extent possible, make those funds available to the CD.

C. Cooperate with the CD in arriving at solutions to water quality problems which the CD is unable to solve. Initiate enforcement action as deemed necessary in cases where water quality standards are being violated.

D. Notify the CD of new non-point source problems for possible mitigation by the CD.

E. Cooperate with the CD in documenting non-point source problems and make available as requested water quality monitoring and analyzing services.

F. Work cooperatively with DNR&C in providing education, information, and other assistance to the CD.

G. Keep DNR&C and the CD informed of new developments in non-point source programs.

H. Assist DNR&C in the review and evaluation of the CD's annual work report.

III. The CD shall within statutory and funding limitations:

A. Prepare, with assistance from DNR&C and DHES, a master water quality management plan for the area within the CD's boundaries for the abatement of non-point source problems. The plan shall be updated and revised from time to time. The plan, as a minimum, shall include the following:

(1) identification of existing and potential non-point source problems,

(2) prioritization of severity of problems,

(3) selection and adoption of best management practices which can be applied to correct identified problems, and

(4) establishment of realistic schedules for abatement of the identified problems.

B. Consider acceptance of funds provided for water quality purposes to carry out the planning, administration, education-information, technical assistance, and cost-sharing functions of a water quality management program either unilaterally or in cooperation with agencies with which the CD has working agreements, such as the SCS, Extension Service, Agricultural Stabilization and Conservation Service, DHES, and EPA.

C. Conduct an education-information program within the CD to inform residents of the significance of water quality management. As a part of this program, the CD shall contact landowners with non-point source pollution problems and offer assistance in bringing about a solution.

D. Annually prepare and submit to DNR&C and DHES copies of a work report. The annual work report shall outline accomplishments, next year's goals, budget constraints, etc.

E. Receive complaints of non-point source problems originating within the district and work cooperatively with the landowners to solve the problems. Should the CD be unable to obtain cooperation, the CD shall notify DHES of the situation.

Other provisions, special projects and activities may be included and are attached as exhibit A and incorporated herein by reference.

This supplement to Memorandum of Understanding shall be effective when signed by each of the parties and may be terminated by mutual agreement or by any party upon thirty (30) days notice in writing to the other parties.

Date 9/18/1978

Lewis & Clark County Conservation District
By: Frank C. Thompson
Chairman, District Board of Supervisors

Date 8/31/78

Montana Department of Natural Resources and Conservation

Ted J. Doney
Director

Date 8-31-78

Montana Department of Health and Environmental Sciences

for Director

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